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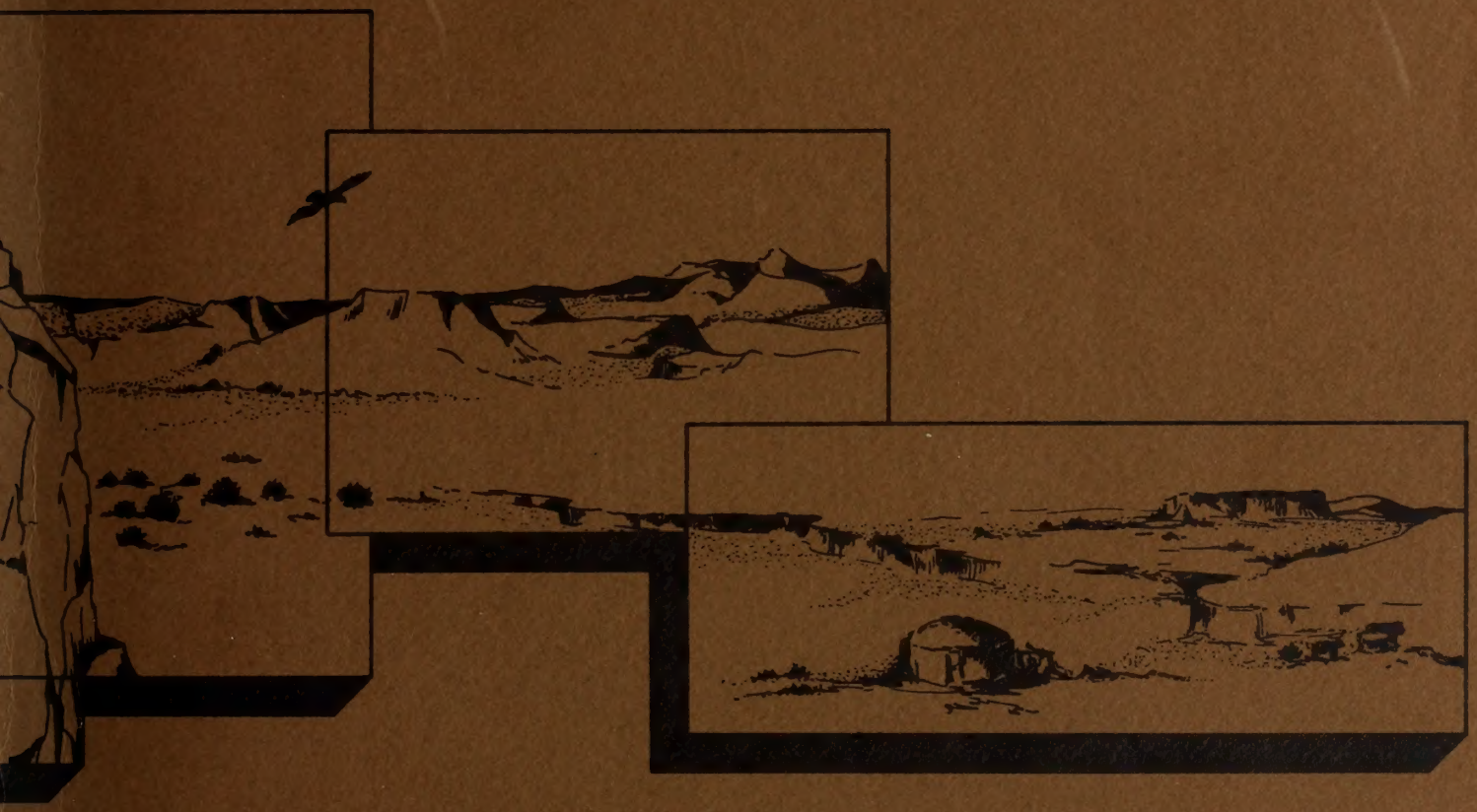
SAN JUAN RIVER REGIONAL COAL ENVIRONMENTAL IMPACT STATEMENT

OCTOBER 1983



UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
ALBUQUERQUE DISTRICT OFFICE
FARMINGTON RESOURCE AREA
FARMINGTON, NEW MEXICO

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
505 Marquette Avenue N.W., Suite 815
Albuquerque, New Mexico 87102

IN REPLY
REFER TO:

1792 (015)

OCT 06 1983

Dear Sir or Madam:

This Second Draft San Juan River Regional Coal Environmental Imact Statement has been developed by the Farmington Resource Area, Bureau of Land Management, in accordance with the Council on Environmental Quality Regulations for the National Environmental Policy Act (40 CFR 1500-1508).

The public review period will end November 21, 1983. You are invited to comment on the adequacy of this draft document. Oral and written comments can be presented during the following public hearing.

Farmington Civic Center November 8, 1983 morning hearing starts 9 a.m.
evening hearing starts 7 p.m.

If you wish to present oral comments, contact Jeff Radford, Public Information Officer, at the Bureau of Land Management, Albuquerque, District Office (telephone (505) 766-2841) by November 1, 1983.

Written comments may also be mailed or submitted in person to:

State Director
Bureau of Land Management
Caller Service 4104
Farmington, New Mexico 87401

Comments must be received by the close of business 4:30 p.m. on November 21, 1983, in order to be considered in the preparation of the final Environmental Impact Statement. Responses to oral and written comments addressing the adequacy of the document will be included in the Final Environmental Impact Statement.

I look forward to receiving your comments, and thank you for your interest and participation.

Sincerely yours,

Michael T. Dietz

L. Paul Applegate
District Manager

Bureau of Land Management
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Bldg. 50, Denver Federal Center
Denver, CO 80225

SAN JUAN RIVER REGIONAL COAL EIS

ERRATA

Page 1-4, Paragraph 6, sentence 1: Should read, "Coal production would result from existing state and Federal leases and from existing and proposed coal mines under contract commitments or mine plans, these include the following coal mines: Mentmore, Lee Ranch, Amcoal No. 1, McKinley, Arroyo No. 1, Black Diamond, Burnham, De-na-zin, Navajo, San Juan, Gateway, and La Plata Mine."

Page 1-8, Paragraph 1, sentence 1: Should read, "The San Juan Juan River Regional Coal Team held a meeting on April 27, 1983."

DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SECOND DRAFT
ENVIRONMENTAL IMPACT STATEMENT
SAN JUAN RIVER COAL REGION

Type of Action: (x) Administrative ( ) Legislative

Abstract: This EIS analyzes the impacts that would occur in San Juan, McKinley, Valencia and Sandoval Counties in northwestern New Mexico in a result of: (1) four alternative levels of competitive coal leasing and developments (2) issuance of 26 Preference Right Lease Applications (PRLAs), presented as Preference Right Lease Issuance. The Environmental Assessment for Preference Right Leasing, New Mexico, (1981) should be referenced for site specific information on the PRLAs.

The competitive coal leasing alternatives range from no competitive leasing to leasing 1.94 billion tons of coal from 39 tracts under the High Alternative. The Minimum Surface Owner Conflict Alternative has been selected as the preferred alternative. Two subalternatives to the Preference Right Lease Issuance Alternative are: (1) alternative lease terms and (2) exchange or legislation. Issuing all 26 PRLAs has been selected as the preferred alternative.

On November 30, 1982, the Bureau of Land Management filed the Draft San Juan River Region Coal Environmental Impact Statement. That document received a 120-day comment period. In response to comments on that document, the Bureau of Land Management decided the public interest would be served by publishing this document as a second Draft EIS rather than as a Final EIS. This document also contains a summary of the Cumulative Overview which covers the effects caused by the interaction of the proposed coal development, the New Mexico Generating Station proposal, and wilderness study proposals. The map packet prepared for the Draft EIS published on November 30, 1982, should be used in conjunction with this statement.

For further information contact: Lee V. Larson
BLM, Farmington Resource Area
900 N. La Plata Highway
Caller Service 4104
Farmington, NM 97401
Phone: Commercial: (505) 325-3581
FTS: 572-6220

Date Filed with EPA: September 30, 1983

James M Parker

Acting Director

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
NEW MEXICO STATE OFFICE
P.O. BOX 1449
SANTA FE, NEW MEXICO 87501

IN REPLY REFER TO
1792 (910)

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Bldg. 50 Denver Federal Center
Denver, CO 80225

September 12, 1983

Dear Interested Parties:

The original draft San Juan River Regional Coal Environmental Impact Statement (EIS) was released for public comment in November of 1982. This document was originally intended to be released in final form, but because of the importance of the coal leasing issue and the interest shown by the public, I have decided to release this document as a second draft.

The public review period will be 45 days. Copies of the final EIS will be provided to those who submit substantive comments on this draft EIS. Comments must be received by the close of the comment period. All comments should be addressed to State Director, Bureau of Land Management, Caller Service 4104, Farmington, New Mexico 87401.

Some of the changes in the document include: lowering the leasing target to 800-900 million tons of inplace coal reserves, considering the non-competitive leases as a separate alternative, adding new alternatives such as exchanging lands in order to protect various areas and discussing alternative lease terms such as Navajo hiring preference.

Abstracts of letters and responses received during the comment period for the original draft are found in Chapter 4. Comment letters received from Federal, State and local agencies and some representative groups are reprinted in their entirety together with the final cumulative overview which is a companion document to the EIS and will be mailed under separate cover.

Reponse to comments will be limited to new comments received on this second draft during the 45-day public comment period.

Sincerely yours,

Charles W. Luscher

Charles W. Luscher
State Director

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SAN JUAN RIVER REGIONAL COAL ENVIRONMENTAL IMPACT STATEMENT

OCTOBER 1983

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
ALBUQUERQUE DISTRICT OFFICE
ALBUQUERQUE, NEW MEXICO

SAN JUAN RIVER REGIONAL COAL EIS

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PREFACE

Seven tracts (Pinehaven, Lee Ranch East, Breadsprings #1 and #2, Hogback, Chico Wash South, and Gamerco #2) lacked sufficient cultural inventory data to apply unsuitability criteria 7 as required under the current regulations 43 CFR 3461.1 (g) (1) and might not be eligible for any further consideration for leasing in the Final EIS. These tracts would not be eligible for further consideration for leasing unless additional information is gathered before the Final EIS is printed.

SUMMARY

SUMMARY

SUMMARY

SUMMARY

This statement assesses the environmental consequences of four alternative levels of competitive coal leasing and developments, and the issuance of 26 Preference Right Lease Applications. The alternatives range from no competitive leasing to leasing 39 tracts, 1.94 billion tons. The Minimum Surface Owner Alternative, consisting of 11 tracts .916 billion tons (.349 billion tons recoverable Federal coal), is the preferred alternative. There are 2 subalternatives to the PRLA Issuance Alternative, these are alternative lease terms and exchange or legislation. Issuing all 26 PRLAs has been chosen as the preferred alternative.

The new leasing target of 800 to 900 million tons of in-place Federal coal (300 to 400 million tons of Federal recoverable coal, preferred alternative) was recommended by the Regional Coal Team on April 27, 1983. This target was the direct result of negotiations between the State of New Mexico and the Bureau of Land Management and resulted in an approximate 40% reduction from the original proposed target alternative of 1.2 to 1.5 billion tons. It was established as the new leasing level by the Secretary on July 14, 1983.

The Preference Right Lease Applications (26) were orginally assessed under the No Action Alternative, however, in response to public comment and the need to further clarify the anticipated impacts from PRLA development the PRLAs are presented separate from other expected development.

A Site-Specific Analysis (SSA) was prepared by the BLM for each tract and served as the basis for tract ranking and alternative formulation by the RCT. These SSAs, are incorporated in this document by reference and are summarized in Appendix A-1 of this EIS. Site specific analysis of the individual PRLA's is available in the PRLA EA (BLM, 1979).

GENERAL CONCLUSIONS

Analysis generally shows that the already projected development (No Action) and Preference Right Lease Issuance will have considerable impacts. Most impacts, which can be attributed to new Federal leasing, gain their significance by adding to an existing taxed situation.

The alternatives do not differ from one another by the nature of impacts, only in magnitude. The alternatives will produce impacts generally in proportion to the coal produced. The magnitude of these impacts tend to be diminished when measured across the entire San Juan River region, but are compounded when measured locally.

The four competitive leasing alternatives, the No Action Alternative and Preference Right Lease Issuance, would further commit the region to an economic base of energy minerals, i.e. coal, oil and gas, and uranium. Therefore, the stability of the region's economy will, more than ever, revolve around the cycles of the nation's energy minerals industry.

The major issues after extensive public review and comment are: the need for coal leasing in a depressed market situation, the availability of sufficient water for reclamation and mining, the potential success of reclamation efforts, the long-term scientific information losses to be incurred from destruction of cultural and paleontological resources, and if the information gained through excavation, extraction, and study of these resources will be of greater value than the losses incurred and the extent to which the proposed actions affect traditional lifestyle of nearly 22,000 Navajos living in the region. These major issues are very controversial and are not completely resolved.

The alternatives are analyzed with emphasis on the significant primary and secondary impacts. The discussion of the impacts is commensurate with the significance of the issues.

NO ACTION ALTERNATIVE

This alternative proposes no competitive leasing of federal coal. Even with no additional leasing, portions of the San Juan River Coal Region will continue to be an active coal producing area. Present yearly production of approximately 17.9 million tons is expected to increase to 40 million tons by 1987.

This alternative covers the development of approximately 800 million tons of in-place coal reserves from existing state and federal leases and proposed mines under contract commitments or mine plans, and other major federally approved projects. This alternative does not include the PRLAs.

No substantial changes in the climate of the region are expected from this alternative. Air pollution from mining and indirect development would be local and not significantly affect air quality except in the immediate vicinity of potential coal development.

Alteration of topography on nearly 25,000 acres would occur as a result of surface and subsurface mining. Coal production would not generally interfere with exploration or extraction of oil and gas or other minerals. Approximately 1,100 fossil collection sites -could be destroyed, but some subsurface fossil information would become available during mining. Soil mixing, contamination, compaction and short-term acceleration of erosion would occur.

A need for approximately 3,600 acre-feet per year of water and some decrease in water quality would occur.

Actual revegetation experience in the San Juan Basin is limited to two mines and a few study plots. Revegetation efforts at these mines and study plots have shown that revegetation can be accomplished. Even with revegetation being achieved to a certain degree, it has not existed for sufficient time to evaluate fully whether the reestablished vegetative community will be capable of self-regeneration and plant succession; and long-term plant diversity is still questionable. However, strict reclamation regulations enforced by the Office of Surface Mining and Mining Minerals Division, New Mexico Energy and Minerals Department would be adhered to.

Land use patterns are expected to shift from agriculture toward mining and semi-urbanization even without additional coal leasing. Several ranches could loose all or a part of their grazing privileges. These losses should be compensated somewhat by fees paid by the mines for the use of private or Indian lands. Vegetation would be removed on nearly 25,000 acres and 3,157 AUMs (less than 1% in the Chaco Planning Unit) would be lost during active mining and before reclamation is complete. Wildlife habitats would also be lost during the period before reclamation is complete.

Development projected without further Federal coal leasing could disrupt a predicted 470 to 950 cultural resource sites. Sacred sites and gravesites important to the Navajo people could be disturbed or destroyed, although measures would be taken to minimize adverse effects.

Dispersed recreational opportunities, such as camping and fishing, are ample throughout the region. The decrease in the quality of these experiences, because of the increased population expected under the No Action Alternative, is expected to be minimal.

Most of the mining considered in this EIS would severely disfigure the landscape, which would not be fully reclaimed for 10 to 20 years after the end of mine life. These lands are not given a high Visual Resource classification and in most cases are infrequently seen by persons not involved in mining, so the degradation of visual quality would not be obvious. Some mining would occur adjacent to major highways and in those places visual quality would be significantly diminished.

Three wilderness study areas exist in the region. Generally, these areas can absorb the additional use anticipated by population growth but some individuals feel that their wilderness experience could be diminished.

Some social-structural and social-psychological disruption would be caused by rapid population growth. Tension between established residents and newcomers can be expected and alcoholism, mental disorders, and crime are predicted to increase.

Income and employment opportunities would increase. This would stimulate the local economy and support otherwise economically prohibitive but personally rewarding life styles such as hobby ranching. On the other hand, this increased income would generate local inflation and create serious hardships for lower paid workers and those on fixed incomes.

New Mexico generally has adequate transportation capacity to handle the presently projected development. Hauling coal by truck could increase road maintenance costs, even beyond what could be collected through regular fees. Most of the coal would be transported by rail.

Increased child and spouse abuse, neglect, mental health, alcohol and drug abuse, and injuries from assults are expected to occur due to the changes that mining will have on the values, beliefs and the traditional lifestyle of the Navajo people.

It is likely that jobs with higher income would be made available to Navajos thus reducing the current high rate of Navajo unemployment. Navajos who

are relocated will receive compensation for the loss of or damages to property from the mining companies.

PREFERENCE RIGHT LEASE ISSUANCE

The discussion presented under this action includes the impacts of the No Action Alternative.

This separate action covers the issuance of 26 PRLA's and development of an estimated 1.4 billion tons of federal coal contained in the 26 PRLAs. Approximately 2.2 billion tons of in-place coal reserves would be available under this action and the No Action Alternative. The preferred action is to issue all 26 PRLAs with the currently proposed lease terms and conditions (Appendix I-2).

No substantial changes in the climate of the region are expected from this alternative. Air pollution from mining and indirect development would be local and not significantly affect air quality except in the immediate vicinity of potential coal development. Population and transportation growth which will accompany mining will have a greater effect on regional air quality than the mining itself.

Alteration of topography on nearly 47,020 acres would occur as a result of surface and subsurface mining. Coal production would not generally interfere with exploration or extraction of oil and gas or other minerals. Approximately 2,237 fossl collection sites could be destroyed, but subsurface fossil information would become available during mining. Soil mixing, contamination, compaction and short-term acceleration of erosion would occur

A need for approximately 16,450 acre-feet per year of water and some decrease in water quality would occur.

Actual revegetation experience in the San Juan Basin is limited to two mines and a few study plots. Revegetation efforts at these mines and study plots have shown that revegetation can be accomplished. Even with revegetation being achieved to a certain degree, it has not existed for sufficient time to evaluate fully whether the reestablished vegetative community will be capable of self-regeneration and plant succession; and long-term plant diversity is still questionable. In addition, since the lands have not been subject to grazing pressure, their tolerance for grazing use is uncerain. However, strict reclamation regulations enforced by the Office of Surface Mining and Mining Minerals Division, New Mexico Energy and Minerals Department would be adhered to.

Land use patterns are expected to shift from agriculture toward mining and semi-urbanization even without additional coal leasing. Several ranches could loose all or a part of their grazing privileges. These losses should be compensated somewhat, by fees paid by the mines for the use of private or Indian lands. Vegetation would be removed on nearly 47,020 acres and 5,198 AUMs (less than 1.6% in the Chaco Planning Unit) would be lost during active mining and before reclamation is complete. Five ferruginous hawks, a prairie falcon and

their nests could be disturbed. Other wildlife habitats would also be lost during the period before reclamation is complete.

A total of 171 cultural resource sites have been found in the PRLAs, and 1,012 to 1,492 are predicted to occur. Many of these sites are very significant, however, regulations largely protect these resources. Sacred sites and unidentified gravesites important to the Navajo people could be disturbed or destroyed, although measures would be taken to minimize adverse effects.

Dispersed recreational opportunities, such as camping and fishing, are ample throughout the region, but the quality of thse experiences may be dimished because of the increased population expected to enter the area.

Most of the mining considered in this EIS would severely disfigure the landscape, which would not be fully reclaimed for 10 to 20 years after the end of mine life. These lands are not given a high Visual Resource classification and in most cases are infrequently seen by persons not involved in mining, so the degradation of visual quality would not be obvious.

Three wilderness study areas exist in the region. Generally these areas can absorb the additional use anticipated by population growth but some individuals feel that their wilderness experience would be diminished.

Continuous increases in population are expected, which could significantly change the social structure of the area and impose a heavy financial burden on most communities and individuals.

Many of the communities will have to obtain funds from outside the region to meet population demands. Such public services as schools, sewers, fire protection and police would all have to be expanded. Even if funding is obtained, these services would be insufficent from time to time because of rapid or unexpected growth. Housing would be expensive and in short supply. The opposite would occur to the housing market if demand for coal suddenly dropped.

Some social-structural and social-psychological disruption would be caused by rapid population growth. Tension between established residents and newcomers can be expected and alcoholism, mental disorders, and crime are predicted to increase.

Income and employment opportunities would increase. This would stimulate the local economy and support otherwise economically prohibitive but personally rewarding life styles such as hobby ranching. On the other hand, this increased income would generate local inflation and create serious hardships for lower paid workers and those on fixed incomes. Some labor intensive industries, such as agriculture, which are unable to pay high wages would find it difficult to compete for labor. Some small businesses would be phased out, thus placing the region's economic stability in the cyclic patterns of the coal industry.

New Mexico generally has adequate transportation capacity to handle the presently projected development. Hauling coal by truck could increase road maintenance costs, even beyond what could be collected through regular fees. Most of the coal would be transported by rail.

Increased child and spouse abuse, neglect, mental health, alcohol and drug abuse, and injuries from assults are expected to occur due to the changes that mining could have on the values, beliefs and the trditional lifestyles of 39 Navajo families. With an influx of people from outside the region, ethnic and cultural clashes are expected to occur. Many of the Navajos will not benefit financially from coal development and yet would suffer from price inflation accompanying the boom. Traditional grazing practices would be interrupted for livestock operators. The destruction of sacred sites and gravesites could also add to the measure of mental illness that is expected to occur. Relocation of Navajo families from homesites that they have occupied for generations will increase measures of illness.

It is likely that jobs with higher income would be made available to Navajos thus reducing the current high rate of Navajo unemployment. The Navajo standard of living would be improved if they could occupy these jobs. Navajos who are relocated will receive compensation for the loss of or damages to property from the mining companies.

SUBALTERNATIVE I: ALTERNATIVE LEASE TERMS -PRLA

The Mineral Lesing Act allows the Bureau to place terms and conditions on leases in order to protect the interests of the United States and to safeguard the public welfare. In addition to the lease terms (Appendicies I-1 and I-2) that have been attached to each PRLA for final showing, the Bureau could choose lease terms other than those it is currently using. The section entitled "Alterntive Mitigating Measures" describes alternative lease terms that are being considered for adoption.

The general effect of the alternative terms and conditions would be to reduce the environmental effects of coal mining.

SUBALTERNATIVE II: EXCHANGE OR LEGISLATION -PRLA

a. Total Exchange or Legislation

If issuance of the PRLAs is found to be not in the public interest, all PRLA lease rights would be exchanged or otherwise transferred. This would eliminate all of the environmental and social effects of coal mining on the subject tracts as well as all of the economic benefits including increased state revenues.

Because the PRLAs contain approximately one-half to two thirds of the Region's surface mineable coal deposits, replacement coal of the same values will be difficult to obtain since most of the coal is obligated. This alternative presents a potential for reducing the overall coal production levels that could be achieved in the Region, thereby lowering the potential for cumulative disturbance of all resources, availability of services and the potential for economic benefits through increased tax revenues and employment. The main benefit of this subalternative would be to direct coal development away from the areas of highest paleontological, cultural, and socioeconomic conflict to areas of less conflict.

b. Exchange or legislation for Selected PRLAs

Under this subalternative, the Bureau would pursue exchanges or other extinguishment of PRLA rights for particular PRLAs which present significant or unusual environmental effects. Numerous possibilities exist, several specific possibilities are; 1) exchange for PRLAs with Navajo Occupancies, 2) exchange for PRLAs with special paleontological values, i.e. fossil forest, and 3) exchange for the Ah-shi-sle-pah WSA. Other choices are possible, but additional analysis is not essential to the decisionmaker at this time.

The effects of this subalternative would be to prevent mining on portions of these tracts and all attendant environmental and socio-economic impacts. The main benefits to this subalternative would be to 1) eliminate a major conflict between the 39 Navajo families living in the area and coal production, 2) retain paleontological rich lands, i.e. fossil forest, in their current status to allow prolonged, periodic scientific study and 3) designate Ah-shi-sle-pah as a wilderness area to provide specific management actions to preserve the wilderness qualities within the WSA boundaries.

The main drawbacks to this subalternative are; 1) elimination of the availability for mining coal reserves and the attendant economic benefits of coal production, 2) would make unavailable over 350 million tons of coal. Non-designation of Ah-shi-sle-pah WSA would result in a resumption of multiple-use managment.

The following discussion summarizes specific impacts of the above examples of partial PRLA lease issuance. It includes the impacts of the No Action Alternative. The same type of impacts are expected to occur under this subalternative, they differ only in magnitude. Some reduction in visual quality would occur, however, the air quality standards are not expected to be exceeded.

Approximately 40,435 acres of topography would be disturbed as a result of surface and subsurface mining. Disturbance or destruction of approximately 2,176 fossil localities could occur.

Approximately 40,435 acres of vegetation, soils, topography and wildlife habitat will be temporarily disturbed and 515 acres could be removed by facilities construction. Subsidence could occur on approximately 28,270 acres.

A need for approximately 15,875 acre feet of water per year could cause a decrease in water quality and quantity.

An estimated 4,935 AUMs would be temporarily lost until reclamation is completed.

Approximately 434 cultural resources sites and 470-950 predicted sites are located in the area referred to by this alternative, they could be destroyed.

Mining would reduce the scenic values on a total of 15,435 acres. Recreational opportunities, such as camping and fishing may diminish due to the increase in population entering the area.

Traffic accidents would increase by more than 89 and average daily traffic by more than 4,190 in the year 2000.

On 11 known gravesites the lessee would need permission to move the gravesites or an area 100 feet surrounding the gravesite would be left unmined. Unknown gravesites would be destroyed if not identified.

Four known sacred sites and an unknown number of sites could be destroyed by surface mining.

Employment in the year 2000 could increase in Farmington and Cuba by 5,191 (16%) and 1,731 (324%), respectively. Population could increase by 1,923 (116%) in Cuba in the year 2000. Fourteen Navajo families occupying the PRLA area and adjacent land would be relocated.

BYPASS ALTERNATIVE

The discussion presented under this alternative includes the impacts of the No Action Alternative and Preference Right Lease Issuance. The same type of impacts are expected to occur under this alternative; they differ only in magnitude.

This alternative would allow the competitive leasing of 129 million tons of inplace federal coal from eight tracts. Mining of these tracts would be in conjunction with the mining on adjacent existing leases and PRLAs. Leasing coal from these tracts would only slightly increase annual production, and would have little economic or social impacts other than to lengthen the period of mining by a few years. Approximately 2.33 billion tons of in-place coal reserves would be available under this Alternative.

Analysis shows that under full production and worst-case analysis the New Mexico's 24-hour air quality standard for total suspended particulates would be slightly exceeded (by 13 ug/m^3). However, due to the strict regulations placed on mining permits and enforcement by State and Federal agencies these air quality standards would not be expected to be exceeded..

Alteration to topography on approximately 53,170 acres would occur as a result of surface and subsurface mining. Approximately 2,508 fossil localities would be disturbed or destroyed.

A need for approximately 16,830 acre-feet of water per year and some decrease in water quality could occur.

Vegetation would be removed on approximately 53,150 acres and 5,801 AUMs would be lost during mining and before reclamation is complete. This represents 1.8 percent of the AUMs in the Chaco Planning Unit.

Up to 200 acres (<1%) of deer and elk winter range would be destroyed for the life of the mines and until reclamation occurs. Nests of six ferruginous hawks, and a prairie falcon could be disrupted.

Of the 1,148 to 1,680 cultural resource sites predicted to occur 199 sites have been found.

Approximately forty-three(43) Navajo families would be relocated under this alternative. Their lives could be substantially disrupted.

MINIMUM SURFACE OWNER CONFLICTS ALTERNATIVE

This is the preferred alternative of the Regional Coal Team (RCT) as adopted on April 27, 1983. The discussion presented under this alternative includes the impacts of the No Action Alternative and Preference Right Lease Issuance. The same type of impacts are expected to occur under this alternative.

This alternative consists generally of tracts that require no surface owner consent, or for which consent has been given. Under this alternative, 916 million tons of inplace federal coal from 11 tracts would be offered for competitive lease. Approximately 3.25 billion tons of in-place coal reserves would be available under this Alternative.

Under full production and worst-case analysis, New Mexico's 24-hour air quality standard for total suspended particulates could be exceeded by 84 ug/m^3. However, due to strict enforcement by State and Federal agencies these air quality standards would not be expected to be exceeded.

Alteration of topography on approximately 66,327 acres would occur as a result of surface and subsurface mining. Approximately 2,373 fossil localities could be disturbed or destroyed. This is fewer fossil localities than the Bypass Alternative however some federal coal would be bypassed under this alternative. No new impacts to wildlife species of high federal interest would occur under this alternative.

A need for approximately 18,950 acre-feet of water per year and a decrease in water quality could occur.

Vegetation would be removed on nearly 66,327 acres and 9,466 AUMs would be lost during mining and before reclamation is complete. This represents 3 percent of the AUMs in the Chaco Planning Unit.

Three-hundred and eighty-four cultural resource sites have been found and 1,612 to 2,200 sites are predicted to occur.

Approximately sixty-two (62) Navajo families would be relocated under this alternative. Their lives could be substantially disrupted.

This alternative would also disperse the socioeconomic impacts by providing a high proportion of development away from Farmington compared to the other alternatives.

TARGET ALTERNATIVE

The discussion presented under this alternative includes the impacts of the No Action Alternative and Preference Right Lease Issuance. The same type of impacts are expected to occur under this alternative; they differ only in magnitude.

Overall, destruction or disturbance of resources under this alternative would be much greater than those discussed under the Bypass or Minimum Surface Owner Conflicts Alternative.

This alternative would allow the competitive leasing of 1.32 billion tons of inplace federal coal from 24 tracts. Approximately 3.5 billion tons of in-place coal reserves would be available under this Alternative.

Under full production and worst-case analysis the New Mexico's 24-hour air quality standard for total suspended particulates could be exceeded by 84 ug/m^3. However due to strict enforcement by State and Federal agencies these air quality standards would not be expected to be exceeded.

Alteration of topography on approxiamtely 82,997 acres would occur as a result of surface and subsurface mining. Approximately 3,637 fossil localities could be disturbed or destroyed.

A need for approximately 20,150 acre-feet of water per year and a decrease in water quality could occur.

Nests of six ferruginous hawks, a prairie falcon, and two golden eagles could be disrupted. Other wildlife habitat would also be destroyed.

Vegetation would be removed on nearly 82,997 acres and 11,243 AUMs would be lost during mining and before reclamation is complete. This represents 3.4 percent of the AUMs in the Chaco Planning Unit.

Five hundred and eighty-three cultural resource sites have been found and 1,826 to 2,597 are predicted to occur.

Approximately one-hundred and nine (109) Navajo families would be relocated under this alternative. Their lives could be substantially disrupted.

HIGH ALTERNATIVE

The discussion presented under this alternative includes the impacts of the No Action Alternative and Preference Right Lease Issuance. The same type of impacts are expected to occur under this alternative; they differ only in magnitude. The impacts associated with the leasing level of this alternative would be nearly double those of the Target Alternative.

Under this Alternative, 1.94 billion tons of inplace federal coal would be competitively offered for lease from 39 tracts. Approximately 4.1 billion tons of in-place coal reserves would be available under this alternative.

Under full production and worst-case analysis the New Mexico's 24-hour air quality standard for total suspended particulates could be exceeded by 86 ug/m^3. However, due to strict enforcement by State and Federal agencies these air quality standards would not be expected to be exceeded.

Alteration of topography on aproximately 115,661 acres would occur as a result of surface and subsurface mining. Approximately 3,930 fossil localities could be disturbed or destroyed.

A need for approximately 21,100 acre-feet of water per year and a decrease in water quality could occur.

Six ferruginous hawks, a prairie falcon, and two golden eagles and their nests could be disrupted. Other wildlife habitat would also be destroyed.

Vegetation would be removed on nearly 115,661 acres and 15,175 AUMs would be lost during mining and before reclamation is complete. This represents 4.6 percent of the AUMs in the Chaco Planning Unit.

Eight hundred and nine cultural resource sites have been found and 2,739 to 3,787 are predicted to occur.

Approximately four-hundred and ninty four (494) Navajo families would be relocated under this alternative. Their lives could be substantially disrupted.

A comparison of the impacts of each alternative and PRLAs is located at the end of Chapter 1 (Refer to Table 1-7 and 1-8). A detailed assessment of the PRLAs and alternatives is found in Chapter 3 of this document.

CHAPTER 1
DESCRIPTION OF THE ALTENNATIVES

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INTRODUCTION

In June of 1979, the Secretary of the Interior adopted a new program for the management of coal resources on federal lands. Information from the Department of Energy as well as the coal mining and consuming industries was used to estimate the demand for new federal coal leasing. Land use plans, industry data, environmental analyses, and the concerns of the public and federal, state and local officials are now being used to identify specific coal lease tracts to supply that demand.

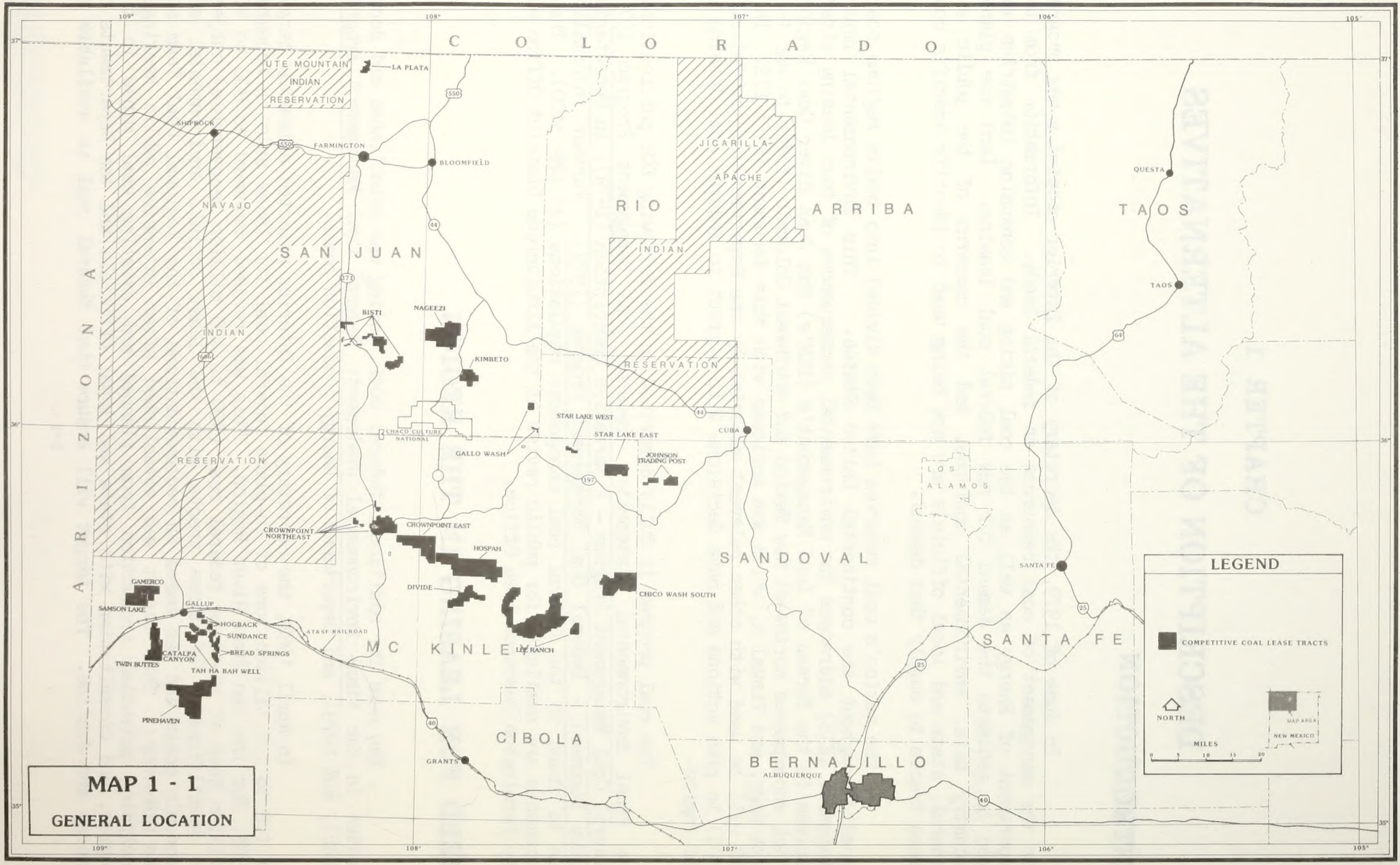
The nation's coal reserves have been divided into twelve regions scattered throughout the continental United States. This Environmental Impact Statement (EIS) addresses the environmental consequences of four leasing alternatives in the Bureau of Land Management's (BLM's) San Juan River Coal Region, which encompasses northwest New Mexico and southwest Colorado (refer to Map 1-1, next page, and Visual A, which was enclosed with this document draft EIS. This EIS will be used with other relevant material by the Department of the Interior (DOI) to plan actions and make decisions with respect to federal coal leasing in the region.

The coal program is fully described in the following DOI publications: the Final Environmental Statement: Federal Coal Management Program 1979; Federal Coal Management Program - A Narrative Description (1979); in Secretarial Issue Document - Federal Coal Management Program (1979). Further information can be found in the federal coal management regulations (43 CFR 3400). These documents are available for public review at the Albuquerque District Office and the Farmington Resource Area Office.

NEED FOR LEASING IN THE REGION

The need for additional federal coal leasing was established and documented in the Final Environmental Statement: Federal Coal Management Program (USDI, BLM 1979), and Department of Energy production goals.

In April 1982, the Secretary of the Interior selected a leasing target of 1.2 to 1.5 billion tons of in-place federal coal for lease sale in December 1983, for the San Juan River Region. This was revised downward to 800 to 900 million tons of in-place federal coal (300 to 400 million recoverable) subject to identification of those tracts with the least social, environmental and economic costs and was based on recommendations of the Regional Coal Team and the Governor. This target was established after extensive public hearings, analyzing potential production from planned and existing coal mines in the region, and consultation with state and local officials and the Departments of Energy and Justice. The target will ensure that federal coal is available to



MAP 1 - 1

GENERAL LOCATION

aid in satisfying anticipated coal demand in the region to ensure competition among coal producers and to meet the country's energy needs.

Also included in this document is the proposed action on issuing leases for approximately 1.4 billion tons of in-place federal coal from 26 Preference Right Lease Applications. Although the Federal Coal Leasing Amendments Act no longer allows non competitive new leasing NRDC v. Bergland established that the Secretary must process the PRLAs to issuance or rejection of the lease.

The level of actual need and the level of leasing within a specific coal region is still subject to the uncertainties of coal demand and the environmental acceptability of mining technologies and level of development. The actual level of development in this region will be determined by the coal market. Prior to mining, permits are subject to federal and state review of individual resource recovery and protection plans and permit application (mine plan).

While the first regional sale has been tentatively scheduled for 1984, no decision has been made as to whether all the tracts selected by the Secretary would be sold at one time or in staggered sales. This should have no appreciable affect on the development time frame used in this analysis or impacts under any alternative.

The alternatives presented in this EIS are analyzed to identify the type and extent of the impacts of competitively leasing various levels of federal coal and options for the Preference Right Lease Applications.

PROGRAM IMPLEMENTATION TO DATE

Following completion of the Chaco/San Juan transition MFP for coal, which considered input from the state, industry, and public sectors, the BLM issued a call for expressions of leasing interest from the public. In addition, qualified surface owners overlying federal coal reserves were offered the opportunity to refuse to allow mining of these coal reserves in exercise of their right under the Surface Mining Control and Reclamation Act of 1977 (SMCRA).

A Regional Coal Team (RCT) was formed in October 1980 with BLM and state officials to oversee the leasing process and make recommendations to the Secretary of the Interior regarding leasing actions and regional leasing targets. A series of meetings open to the public was held by the RCT to consider: surface owner refusals to allow mining, industry interest in leasing and development, energy needs for the region, and the type of geologic and mining information to be used by the former Minerals Management Service (MMS) to delineate specific tracts for potential leasing.

The MMS then prepared tract summary reports that the BLM used to prepare a site-specific analysis (SSA) for each of the 50 tracts that MMS delineated. (Refer to Appendix A-1 for summaries of the SSAs). The RCT analyzed these SSAs and ranked the tracts based on coal economics, and environmental, social, and economic impacts. From this analysis 39 tracts were carried forward and the RCT formulated leasing alternatives along with the No

Action Alternative, consisting of varying levels of production and combinations of tracts to be assessed in this EIS.

The Secretary of the Interior may select an array of tracts or a resource quantity intermediate in magnitude to those analyzed. This could be developed through changes in the proposed level of leasing, different tract combinations, alteration of tract boundaries, changes in the lease sale schedule, or modification of the leasing target. These alternatives could be developed in response to expressed preferences of the Governors of New Mexico and Colorado, the analysis in the EIS, recommendations of the RCT, Indian Tribes, Department of Justice DOJ, public input, and coordination with other federal agencies.

In addition to competitive coal leasing, issuance of 26 Preference Right Lease Applications (PRLAs) are addressed in this EIS. These were reviewed in the Environmental Assessment for Coal Preference Right Leasing, New Mexico (USDI, BLM 1981).

Further information on the implementation of the federal coal program in the region and the history and background leading to the publication of this EIS is found in Appendices A-2 and A-3.

DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

No Action Alternative

The No Action Alternative proposes no new leasing of federal coal. This alternative does not include issuance of the PRLAs. However, it should be noted that the Department is under an obligation to fully adjudicate all pending PRLAs. Even with no additional leasing, portions of the San Juan River Coal Region will continue to be active coal producing areas.

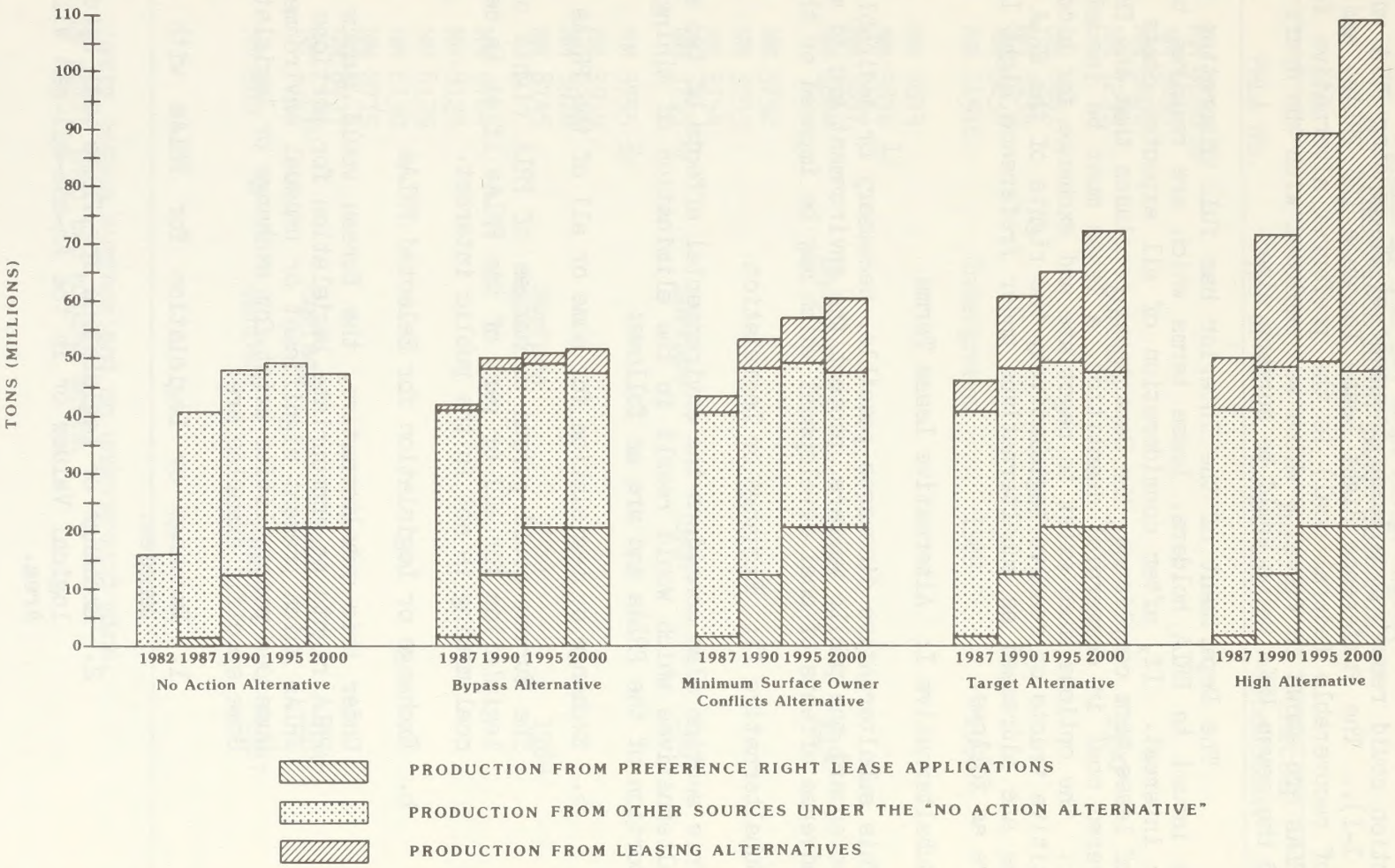
Coal production would result from existing state and federal leases and from existing and proposed coal mines under contract commitments or mine plans, these include the following coal mines: Mentmore, Lee Ranch, Amcoal No. 1, McKinley, Arroyo No. 1, Black Diamond, Burnham, De-na-zin, Navajo, and San Juan Mine. In place reserves from these sources are approximately 800 million tons, with 600 million tons being recoverable. Projected coal production in 1987 and the year 2000 would be approximately 39.4 and 26.5 million tons, respectively (refer to Figure 1-1). Coal baseline figures were derived under consultation with state and federal agencies.

Federally approved projects include the Animas-La Plata Irrigation Project, Star Lake Railroad, Fruitland Coal Load Transmission Line.

Approximately 25,000 total acres would be disturbed under this alternative. Acres disturbed in the years 1987 and 2000 are 8,000 and 16,000 respectively.

FIGURE 1-1

COAL PRODUCTION BY ALTERNATIVE FOR 1987, 1990, 1995, AND 2000



Preference Right Lease Issuance

This action proposes no new competitive leasing of federal coal. Coal production could result from lease issuance of 26 pending PRLA units (refer to Table 1-1). The Preference Right Lease Issuance (26 PRLAs, and 1.15 billion tons of recoverable federal coal) is the preferred alternative for the PRLAs. The PRLAs are shown in Visual C which was enclosed with the draft EIS. All but two of the seven PRLA units would be surface mined.

The Department of the Interior has full discretion to include in leases issued to PRLA holders, lease terms which are required to protect the public interest. If, after consideration of all expected costs including the cost of lease term compliance, the Department concludes that the PRLA holder has discovered coal in commercial quantities, a lease must be issued to the PRLA holder. The options also exist to negotiate and exchange for bidding rights on competitive tracts or resolve legislatively the rights of the PRLA holder. These options are addressed as subalternatives under Preference Right Lease Issuance and are as follows:

Subalternative I: Alternative Lease Terms

This subalternative discusses possible, necessary or desirable measures to safeguard the public welfare, protect the environment and to mitigate other adverse effects of coal development which may be imposed on the leases.

Subalternative II: Exchange or Legislation

This section also considers the environmental effects of two subalternatives which would result in the elimination of mining for all or a portion of the PRLAs and are as follows:

a. Exchange or Legislation for some or all of the PRLAs

The Bureau could pursue exchanges of PRLA rights or appropriate legislation for all or part of the PRLAs if it is determined that coal mining is not in the public interest.

b. Exchange or Legislation for Selected PRLAs

Under this subalternative, the Bureau would pursue exchanges of PRLA rights or appropriate legislation for portions of particular PRLAs which present significant or unusual environmental effects. Numerous possibilities exist for exchange or legislation. Some specific examples are:

1. Exchange or Legislation for PRLAs with Navajo occupancies.

2. Exchange or Legislation for PRLAs with Special Paleontological Values or in the Ah-she-sli-pah Wilderness Study Area.

TABLE 1-1
ESTIMATED DEVELOPMENT DATES FOR THE
PRLAs IN THE SAN JUAN RIVER REGION
(PREFERENCE RIGHT LEASE ISSUANCE)

Company	PRLA No.	Type of Mine	Initial Construction	Initial Production	Abandonment
Eastern Assoc.	NM 3836 1/				
	NM 3835				
	NM 6802				
	NM 7235	Surface	1989	1990	Year 2025
Eastern Assoc. & Kinark-North	NM 6801				
	NM 3834				
	NM 3838				
	NM 11916	Underground	1989	1990	Year 2025
Eastern Assoc. - South	NM 6803				
	NM 3836 1/				
	NM 3837				
	NM 6804	Underground	1989	1990	Year 2025
Arkland #1	NM 3752				
	NM 3753				
	NM 3754				
	NM 3755 2/	Surface	1986	1987	Year 2022
Arkland #2	NM 3755 2/				
	NM 3919				
	NM 3918				
	NM 8745	Surface	1988	1989	Year 2024
Thermal Energy Company	NM 9764				
	NM 8128				
	NM 8129				
	NM 8130				
	NM 8715				
	NM 8717				
	NM 11670	Surface	1986	1987	Year 2022
Freeman United	NM 585	Surface	1986	1987	Year 2022

Note: 1/ This PRLA covers both a surface and an underground mine.
2/ This PRLA is split into two mining units.

The San Juan River Regional Coal Team held a meeting on May 26, 1983. Because of the support for wilderness designation for the Ah-shi-sle-pah Wilderness Study Area (WSA) by other groups, including the State of New Mexico, the Regional Coal Team directed BLM to consider the impacts of exchanging the PRLA's located in this WSA. A subgroup of the Regional Coal Team composed of the BLM and representatives from the State of New Mexico studied the exchange. This report is available at the Farmington Resource Area and Albuquerque District Office.

The purpose for analyzing the PRLAs is to consider lease terms and conditions under which the lease will be granted. Where the Secretary determines that coal development, would not be in the public interest on a Preference Right Lease Application or portion thereof, a PRLA may be relinquished in exchange for: 1. a new coal lease (with Congressional authorization), 2. issuance of coal lease bidding rights of equal values or, 3. Federal coal lease modifications such as: Legal requirements allow the BLM to substitute up to 160 acres of coal land adjacent to the PRLA tract, without resource conflicts, for the portion of the PRLA being relinquished.

In-place reserves for the 26 PRLAs are approximately 1.4 billion tons, with 1.15 billion tons being recoverable. Projected coal production in 1987 and the year 2000 would be approximately 1.6 and 20.5 million tons, respectively (refer to Figure 1-1). Total PRLA recoverable reserves cannot be directly determined from the total annual PRLA production rate because some PRLA holders have more than one Logical Mining Unit (LMU). A LMU is defined as a tract or tracts of land where the recoverable reserves can be mined out within 40 years.

Approximately 22,020 total acres would be disturbed under this Alternative. Before reclamation, surface mining would disturb approximately 1,500 acres in 1987 and 10,000 acres in the year 2000 on the PRLAs. Approximately 705 acres would be disturbed on PRLA mining units by onsite surface facilities, including coal and topsoil storage acres, haul, and access roads, and power and telephone lines. The site specific impacts, by individual PRLAs, as identified in the Final Environmental Assessment for Coal Preference Right Leasing, New Mexico (USDI, BLM, 1981b), are incorporated by reference into this document and are summarized in Appendix A-6 and in Chapter 3 generally.

Bypass Alternative

Under this alternative eight competitive tracts would be offered for lease sale. These would be surface mined (refer to Table 1-2). These eight tracts are located next to existing and proposed mines and PRLAs (refer to Table 1-3). It is assumed that the tracts would not be mined (would be bypassed), unless adjacent mining operations extend into them. If the tracts were mined, the construction, mining and coal transportation personnel would be the same personnel working on operating mines adjacent to the tracts. Construction would begin between 1984 and the year 2009, with production starting during the second year of construction. Surface mines would require 4 years for construction.

Federal in-place reserves that would be offered for lease total approximately 129 million tons, of which 113 million tons would be recoverable. Projected coal production would be approximately 1.63 million tons from four tracts in 1987 (start-up) and 3.75 million tons from four tracts for the year

TABLE 1-2

COMPETITIVE COAL LEASE TRACTS BY ALTERNATIVES

Bypass Alternative	Minimum Surface Owner Conflicts Alternative	Target Alternative	High Alternative	
La Plata #1	La Plata #1	La Plata #1	La Plata #1	Bisti #2
Star Lake West #2	La Plata #2	La Plata #2	La Plata #2	Catalpa Canyon
Kimbeto #2	Kimbeto #1	Star Lake West #2	Star Lake West #2	Sundance
Gallo Wash #1	Kimbeto #2	Kimbeto #1	Kimbeto #1	Samson Lake #2/2
Bisti #6/8	Nageezi	Kimbeto #2	Kimbeto #2	La Plata #3
Hospah #1	Gallo Wash #2	Nageezi	Nageezi	La Plata #4
Gamerco #1 (HC)	Lee Ranch East	Gallo Wash #1	Gallo Wash #1	Star Lake East (LC)
Bisti #4	Lee Ranch Middle	Gallo Wash #2	Gallo Wash #2	Crownpoint Northeast
	Lee Ranch West	Bisti #6/8	Bisti #6/8	Crownpoint East (HC/LC)
	Divide	Lee Ranch East	Lee Ranch East	Chico Wash South
	Hospah #2	Lee Ranch Middle	Lee Ranch Middle	Ta-ha-bah Well
		Lee Ranch West	Lee Ranch West	Hogback
		Divide	Divide	Twin Buttes
		Hospah #1	Hospah #1	Pinehaven
		Hospah #2	Hospah #2	Bread Springs #1
		Gamerco #1 (HC)	Gamerco #1 (HC)	Bread Springs #2
		Bisti #4	Bisti #4	Gamerco #1 (LC)
		Johnson Trading Post	Johnson Trading Post	Gamerco #2 (LC)
		Star Lake East #1	Star Lake East #1	Samson Lake #1
		Bisti #1	Bisti #1	
		Bisti #2		
		Catalpa Canyon		
		Sundance		
		Samson Lake #2/2		

TABLE 1-3

COMPETITIVE COAL LEASE TRACTS LOCATED ADJACENT
TO EXISTING AND PROPOSED MINES, LEASES, & PRLAS
(BYPASS ALTERNATIVE)

Tract	Existing Lease/Mine	Proposed Lease/Mine	PRLA
La Plata #1	Black Diamond Mine		
Star Lake West #2		Star Lake Mine	NM 8715
Kimbeto #2			NM 3918 NM 3919
Gallo Wash #1			NM 8128
Bisti #6 a/	NM 186612		
Bisti #8 a/	NM 186612 NM 186615 De-na-zin Mine		
Hospah #1		South Hospah Mine	
Gamerco #1 (HC)	Mentmore Mine		
Bisti #4			NM 3754

Note: a/ Bisti #6 and #8 are one tract. They have been separated to show which leases and mine they are located next to.

2000 (peak production). (Refer to Figure 1-1). Projected average annual coal production would be approximately 2.26 million tons from 1985 through the year 2007 for seven of the eight tracts. The Hospah #1 tract is expected to be combined with the proposed South Hospah Mine rather than being developed separately. The "diligent development" requirements of 30 CFR 211 would thus be met in the combined or amended mine plan, even though actual operations on the portion analyzed in this EIS may not begin until many years later.

The total amount of surface disturbed on these tracts would be approximately 6,130 acres. Before reclamation, surface mining would disturb approximately 373 acres on four tracts in 1987 and approximately 1,342 acres on four tracts in the year 2000 (refer to Table 1-4). Approximately 600 acres would be disturbed for onsite surface facilities, including coal and topsoil storage areas, haul and access roads, and power and telephone lines. No additional construction workers would be required since these would be extensions of existing operations. Construction workers would be replaced by production and transportation workers.

TABLE 1-4
SURFACE ACRES DISTURBED
BY EACH ALTERNATIVE AND PRLAs

Alternative [a]	Mining 1987	Mining Year 2000	Surface Facilities	Average Acres/Year	Acres/ Mine Life
No Action	8,000	16,000	1,000	600	25,000
Preference Right Lease Issuance	1,500	10,000	705	550	22,020
Bypass	364	1,342	600	395	6,130
Minimum Surface Owner Conflicts	308	4,988	1,050	510	19,302
Target	859	10,593	2,100	1,177	35,977
High	1,771	23,641	3,500	2,120	68,641

[a] Impacts are attributable solely to a particular alternative or action.

Minimum Surface Owner Conflicts Alternative

This alternative was recommended as the preferred alternative by the Regional Coal Team (RCT) at the April 27th RCT meeting. This preferred alternative is that of the RCT, and does not bind the Secretary in any way in reaching a final federal leasing decision.

Under this alternative 11 tracts would be offered for lease sale, six of the tracts listed in Table 1-2 would be surface mined, and five would be underground mined.

It appears that minimal conflicts with surface owners regarding coal mining would occur on these tracts. There is minimal surface owner conflict because, either there is no surface owner consent required, or surface owner consent has been acquired, or the tract is for an underground mine. Federal in-place reserves that would be leased are approximately 916 million tons, of which 349 million tons are recoverable. Projected coal production would be approximately 2.1 million tons in 1987 (start-up) from three tracts and 13.4 million tons for the year 2000 (peak production) from seven tracts (refer to Figure 1-1). Projected average annual coal production would be approximately 7.15 million tons from 1985 through the year 2007 for 9 of the 11 tracts.

Gallo Wash #2 and Hospah #2 are expected to be combined with existing operations, rather than being developed separately. The "diligent development" requirements of 30 CFR 211 would thus be met in the combined or amended mine plan, even though actual operations on the portion analyzed in this EIS may not begin until many years later.

The total amount of land disturbed on these tracts would be approximately 19,302 acres. Acres disturbed per year are listed in Table 1-4. Before reclamation, surface mining would disturb approximately 308 acres on two tracts in 1987 and approximately 4,988 acres on five tracts in the year 2000. Approximately 1,050 acres of these tracts would be disturbed by onsite surface facilities composed of coal and topsoil storage areas, haul and access roads, and power and telephone lines.

Construction would begin between 1984 and 1994, with production starting during the second year of construction. Surface and underground mines would require 4 and 6 years respectively for construction.

An estimated 4,136 construction jobs would be created in bringing the 11 tracts into production. Not all of these jobs would exist in any given year. As the mines came into production in the second year, a number of construction workers would be replaced by production and transportation workers.

Target Alternative

This alternative proposes to offer for lease 24 tracts (refer to Table 1-2). Nineteen tracts would be surface mined and five would be underground mined. Federal in-place reserves that would be leased are approximately 1.32 billion tons, with approximately .7 billion tons being recoverable. Projected coal production would be approximately .005 billion tons in 1987 (start-up) on 12 tracts and .025 billion tons in the year 2000 (peak production) on 16 tracts (refer to Figure 1-1). Projected average annual coal production would be approximately .03 billion tons from 1985 through the year 2007 for 21 of the 24 tracts.

The Hospah #1, Gallo Wash #2, and Hospah #2 tracts are expected to be combined with existing operations rather than being developed separately. The "diligent development" requirements of 30 CFR 211 would thus be met in the combined or amended mine plan, even though actual operations on the portion analyzed in this EIS may not begin until many years later.

The total amount of disturbance on these 24 tracts would be approximately 35,977 acres. Acres disturbed per year are listed in Table 1-4.) Before

reclamation, surface mining would disturb approximately 859 acres on 11 tracts in 1987 and 10,593 acres on 14 tracts in the year 2000. Approximately 2,100 acres of these tracts would be disturbed by onsite surface facilities, including coal and topsoil storage areas, haul and access roads, and power and telephone lines.

Construction would begin between 1984 and 1994. Surface and underground mines would require 4 and 6 years respectively for construction, and production would start during the second year of construction. Full production level would be reached in four to six years.

An estimated 6,958 construction jobs would be created in bringing the 24 tracts into produciton. Not all of these jobs would exist in any given year. As the mines came into production in the second year, a number of construction workers would be replaced by production and transportation workers.

High Alternative

This alternative proposes to offer for lease all 39 tracts brought forward in the tract selection process. Of this total, 28 tracts would be surface mined and 11 would be underground mined. All 39 competitive coal lease tracts are shown on Visual C (enclosed with the draft EIS) and listed in Table 1-2.

Federal in-place reserves that would be leased total approximately 1.94 billion tons, of which approximately 1.09 billion tons are recoverable. Projected coal production would be approximately .009 billion tons in 1987 (start-up) for 19 tracts and .062 billion tons in the year 2000 (peak production) for 30 tracts (refer to Figure 1-1). Projected average annual coal production would be approximately .024 billion tons from 1985 through the year 2007 for 36 of the 39 tracts. The Hospah #1, Gallo Wash #2, and Hospah #2 tracts are expected to be combined with existing operations, rather than being developed separately.

Construction would begin between 1984 and 1994. Surface and underground mines would require 4 and 6 years respectively for construction. Production would start during the second year of construction.

The total amount of surface disturbed on these tracts would be approximately 68,641 acres. Before reclamation, surface mining would disturb approximately 1,771 acres on 17 tracts in 1987, and 23,641 acres on 22 tracts in the year 2000. Approximately 3,500 acres of these tracts would be disturbed by onsite surface facilities, including coal and topsoil storage areas, haul and access roads, and power and telephone lines. Acres disturbed per year are shown in Table 1-4.

An estimated 10,237 construction jobs would be created in bringing the 39 tracts into production. Not all of these jobs would exist in any given year. As the mines began production in the second year, a number of construction workers would be replaced by production and transportation workers. Four to six years would be required to reach full production capacity.

AUTHORITIES FOR COAL LEASING AND DEVELOPMENT

This section presents an overview of the major laws that authorize the leasing of federal coal resources. The primary emphasis is on statutes that directly control leasing and mining activities. Other authorities dealing with site-specific decisions on coal development are cited in Appendices A-4 and A-5.

Mineral Leasing Act of 1920

This act provided that deposits of coal, phosphate, potassium, oil, oil shale, gas and sodium could be acquired through a leasing system. This law specifies, among other things, minimum royalties, acreage limitations, and the lease term required for each kind of leasable mineral.

Federal Coal Leasing Amendments Act of 1976 (FCLAA)

The broad purpose of the FCLAA is to provide a more orderly procedure for the leasing and development of coal presently owned by the United States. Among the most significant requirements of the FCLAA governing the awarding and development of federal leases are the following:

1. All leasing must be by competitive bidding for fair market value.

2. Issuance of prospecting permits is abolished.

3. Diligent development and continued operation is required (except continuous operation may be waived upon payment of advance royalties) as required by 30 CFR 211.1 (a) (13 & 14).

4. Leases to a single entity are limited to 100,000 acres nationwide (as well as 46,080 acres in a particular state).

5. State shares of royalties were raised from 37 1/2 percent to 50 percent, with the new portion of the monies available not just for construction of roads and schools, but also for a wide range of specific services and facilities in impacted areas.

6. Public bodies were entitled to have reserved a reasonable number of leasing tracts for their own energy production.

Federal Land Policy and Management Act of 1976 (FLPMA)

The purpose of FLPMA is to provide the first comprehensive statutory statement of purposes, goals, and authority for the use and management of federally-owned lands administered by the Secretary of the Interior through the Bureau of Land Management. FLPMA included the following basic item:

1. Statutory framework for land-use planning for public lands.

2. Confirmation that the BLM may continue to rely on existing plans.

3. Liberalized use of mineral revenues by states and local governments. FLPMA provided that the entire 50 percent of the funds received by the federal government for the development of leasable minerals on federal land could be used for any public purpose. FLPMA also established a program to provide low-interest loans to states and local governments impacted by federal land mineral development activities.

4. Requires review of all BLM roadless areas of 5,000 acres or more (and roadless islands) for potential designation as wilderness.

5. Authority to exchange lands or interests in lands.

Surface Mining Control and Reclamation Act of 1977 (SMCRA)

This act was passed in response to concern over the potential extensive environmental damage that may be caused by coal mining, and because of the technological and economic changes that now favor surface over underground mining. SMCRA established uniform minimum federal standards for regulating surface effects of coal mining and reclamation activities throughout the country and for ensuring adequate protection from the environmental impacts of surface mining operations in all states.

Other features of SMCRA relevant to the leasing and development of coal are:

1. Authority to exchange federal lands already under lease in an alluvial valley floor and are subject to the grandfather clause in Section 510(b)(5) of the act.

2. A requirement for the consent of certain qualified private surface owners before leasing of any federal coal underlying privately-owned surface.

3. Provisions for designating lands unsuitable for coal mining.

GENERAL STIPULATIONS

The development of federal coal resources must be carried out in compliance with existing federal and state laws and regulations. The Surface Mining Control and Reclamation Act of 1977 (SMCRA) provides for state regulation of surface mining and reclamation on state and private lands, as well as federal lands under the terms of a cooperative agreement between the Department of the Interior and the State of New Mexico. New Mexico has the primary responsibility for assuring that standards are maintained for regulating surface mining and reclamation. The regulations that have been developed address the environmental protection standards for coal mining. Some of the standards which have been covered include restoration of the land to a condition capable of supporting the uses that it was capable of supporting prior to mining, use of explosives in accordance with state and federal laws, establishment of permanent vegetative cover on areas affected by mining, segregation and replacement of the individual horizons of topsoil, and the assumption of responsbility for successful vegetation on the mined area for a given period of time.

Each lease operator is required to submit a mining and reclamation plan that complies with the rules and regulations of the State of New Mexico, the Office of Surface Mining (OSM), or the Bureau of Land Management. The Bureau of Land Management has the responsibility to assure that both efficient mining practices are utilized and environmentally sound mining practices are applied to the development of the federal coal to protect the new coal resources. OSM has the responsbility on federal lands to approve mining and reclamation permit applications, assure permit compliance, and designate lands as unsuitable for mining in response to petitions. The states have the primary responsibility to assure that the standards for surface mining and reclamation on all lands are maintained. These regulations deal with water conditions, land use, cultural resources, reclamation, wildlife, and mine safety practices.

COMMITTED MITIGATION MEASURES

The development of federal coal resources must be carried out in compliance with exiting federal and state laws and regulations. All mining would be done in accordance with all statutory and regulatory minimums, including the requirements in the standard coal lease form (Appendix I-1).

Special stipulations have been developed for the PRLAs (Appendix I-2) Stipulations required for each PRLA are available for public review in the Albuquerque District and Farmington Resources Area offices. These or similar stipulations will be adopted by BLM and BIA for the competitive lease tracts. The OSM will monitor compliance with the lease terms and stipulations. Uncorrected or persistent violations of lease terms may result in an action to cancel the lease. A detailed monitoring plan will be determined during mine plan development. The following major requirements under these standard measures and committed special stipulations include the following protective measures.

Reclamation

Before mining will be allowed, each lessee will have to show that reclamation of the lands to its pre-mining productivity is economically and technically feasible. This requires the lessee to show how he intends to carry out revegetation and to submit studies and information showing that revegetation to a pre-mining level can be successful on the particular lease. Extensive bonding is required the lessee and is not released until reclamation success is proven. The lessee does not have to show absolute certainty of success, but must show that success is likely.

Cultural Resources

The standard lease form requires intensive cultural resource inventory as part of mine plan development (Section 31 (a)). Before the lessee conducts any surface disturbance activities on the lease, he must at his expense do a complete cultural resources survey (class III) on federal lands or lands overlying federal coal of the entire area to be disturbed using the services of a qualified professional cultural resource specialist.

Following intensive cultural resource inventory, sites will be evaluated, and determinations of National Register eligibility will be made by the office of Surface Mining in consultation with and concurrence of the BLM or BIA and the State Historic Preservation Officer. The Office of Surface Mining, under consultation and concurrence with the State Historic Preservation Officer, Bureau of Land Management, and Bureau of Indian Affairs (if BIA-administered lands are involved) will identify effects and appropriate measures to be taken for mitigation of effects on sites which have been determined eligible for the National Register.

Section 31(a) of the standard lease form is interpreted to provide for in-place preservation of sites (including buried sites found during mining) which may be determined eligible for the National Register when such in-place preservation is determined by the regulatory authorities, in consultation with the SHPO, to constitute appropriate mitigation of adverse effect.

Surface coal mining operations on the identified sites, which do not require in-place preservation, will be allowed after the lessee carries out measures to avoid adverse effects to the sites in accordance with the plan approved by the Office of Surface Mining with concurrence from the Bureau of Land Management, Bureau of Indian Affairs and the State Historic Preservation Officer.

If any cultural resources are discovered during the mining, the lessee is required to halt operations until the resource has been examined.

Lessees of the following tracts, Kimbeto #1, Kimbeto #2, Gallo Wash #1, Gallo Wash #2, Hospah #1, Hospah #2, Bisti #4, Crownpoint Northeast, Crownpoint East (HC/LC) shall take the following actions to protect the stability of standing walls of ruins within the Chaco Culture National Historical Park and the detached portions of the park:

1. A monitoring program approved by the BLM under consultation with the National Park Service will be establish to monitor the affects of blasting or other related mining activities on the stability of the ruins.

2. Coordination with the National Park Service will be undertaken concerning any changes that would affect site condition. This may include restriction for any damage that can be demonstrated.

Standing walls at Site LA 44728 will be stablilized to standards specified by the Bureau of Indian Affairs, at the expense of the lessee of the Crownpoint Northeast Tract and prior to any activity which might damage the structure.

During mining this site will be included in a monitoring program to monitor the affects of blasting and other mining related activity, and coordination with the Bureau of Indian Affairs will be undertaken concerning any changes that would affect site condition . This may include restriction for any damage that can be demonstrated.

LA 44728 is a small, but very well preserved Chacoan structure which is believed to have been built as a shrine. It is an outstanding example of a

specialized form of twefth century Anasazi architecture and warrants preservation for future generations.

Ethnographic studies shall be completed at mine plan to ensure that properties of possible associated cultural values to regional cultural groups are identified. Such properties should include those sites protected under the American Indian Religious Freedom Act, human burial sites, and any sites of particular historic value to the development of the cultural groups concerned. Following identification of such properties, appropriate mitigation measures approved by the Bureau of Land Management and/or the Bureau of Indian Affairs and under consultation with the State Historic Preservation Officer shall be established and implemented.

Paleontological Resources

Before the lessee may disturb the surface of federal lands or lands overlying federal coal, a determination to complete a paleontological survey must be made of the mine plan area. If required, the report must contain recommendations for protecting the larger and more conspicuous fossils of scientific interest. The lessee is responsible for the costs of these protective measures. In addition, if the lessee discovers larger and more conspicuous fossils of possible significant scientific interest, then the lessee must notify the authorized officer of BLM or BIA and not disturb the fossils until the government has had the opportunity to evaluate the situation. Operations would be allowed to continue if the fossil can be moved without diminishing its value.

Gravesites

Each lessee is required to survey the lease and interview local residents for information on gravesites and to avoid mining within 100 feet of a gravesite unless the gravesite is lawfully relocated. This is in addition to the SMCRA requirements on cemetaries.

Residences

Each occupied dwelling will be protected from mining by a 300-foot buffer zone unless the owner of the dwelling gives permission to mine closer.

Water Resources

The lessee shall protect the physical and legal availability of existing water sources in the lease application area. Any water removed or contaminated due to coal mining operations shall be replaced by the lessee. Although replacement water need not be identical to the original water source, it shall be of equal quality and quantity or better. This is in accordance with New Mexico water law and the State Engineers office who make all water allocation determinations.

Sacred Sites

Each proposed lease contains a notification procedure to allow an opportunity for mitigation of adverse affects on sacred sites. For this purpose, the lease will include a requirement that the lessee give notice of pending mining to the Navajo Tribe, the Tribal Chapter in which the mining is located, and the Navajo Medicineman's Association.

Wildlife

The lessee is required to include wildlife mitigation in the mine plan, avoid or otherwise protect raptor nests, and conduct surveys to locate Federal and State threatened and endangered species.

The lessee shall conduct a detailed survey for migratory bird species of High Federal Interest on areas that will be disturbed by surface coal mining. The BLM shall approve the survey. The survey shall be completed before the lessee applies for a permit under the Surface Mining Control and Reclamation Act. The nest and a buffer zone will be preserved from surface disturbance unless the surface management agency and the Fish and Wildlife concur that surface coal mining will not adversely affect the migratory bird habitat during the periods when such habitat is used by the species. The lease application area has not been completely surveyed for migratory birds of High Federal Interest. Surveys at mine plan stage would be necessary to locate new nests.

T & E

Surveys for federal or state threatened or endangered species will be conducted prior to surface disturbance. These surveys will be required as committed stipulations for PRLAs as well as new leases. If endangered species are located, OSM or the surface managing agency (BLM or BIA) will re-initiate formal consultation with the FWS as required by the Endangered Species Act of 1973. Appendix D provides background information for compliance with the Endangered Species Act of 1973.

One Hundred percent surveys for black-footed ferrets will be done at the mine plan stage. Also, if surface disturbance is delayed for two years or more beyond the mine plan stage, then a one hundred percent survey for ferrets will be done one year prior to surface disturbance.

Vegetation

Surveys will be conducted to locate federal and state threatened and endangered plant species.

Wilderness Study Areas

Each lease will bar the lessee from surface coal mining in a Wilderness Study Area until the Congress decides upon the status of the land and requires all operations to be consistent with any Congressional decision on the lands.

Surface Owners

Each surface owner with a patent containing a reservation of coal for the United States is generally entitled to protection before coal is surface mined. The protection consists of imposing on the lessee the obligation to receive the qualified surface owner's consent and to post a bond to compensate the owner for damages to crops, improvements, and forage.

UNSUITABILITY CRITERIA

It is the Department of the Interior's responsibility to carry out the review of federal lands as to their suitability for surface coal mining. This review is conducted under Section 522(b) of the Surface Mining Control and Reclamation Act of 1977, principally through land use planning assessments.

Unsuitability criteria (refer to Appendix A-10) [found in Title 43 CFR 3461.1 (a) (1) through (t) (1)] have been applied to the PRLAs and competitive coal lease tracts addressed in this EIS. The results of this application are found in Table 1-5, with a general explanation which follows. Also as a result of this application, stipulations for the PRLAs have been developed; they appear in Appendices I-1 and I-2. Stipulations that are attached to each individual PRLA along with maps showing the application of unsuitability criteria can be reviewed at the BLM New Mexico State Office, Albuquerque District Office or Farmington Resource Office. These or similar stipulations will be attached to any leases issued for the competitive coal lease tracts.

The application of unsuitability criteria on surface administered by the BIA was completed in accordance with the Memorandum of Understanding (MOU) signed by BIA in July 1982 and BLM in June 1982. Copies of this MOU are available at the BLM offices in Farmington, Albuquerque and Santa Fe.

Application of Criteria

Criteria #5 (VRM Class I), #6 (Permitted Lands for Scientific Studies), #8 (National Natural Landmark or Natural Areas), #17 (Municipal Watersheds) #18 (National Resource Waters) #19 (Alluvial Valley Floors), and #20 (Federal Lands Unsuitable by State Rulemaking) were found to have no effect on the suitability of the PRLA's or competitive coal lease tracts to be mined.

After consultation with the U.S. Fish and Wildlife Service (FWS) and the State of New Mexico, wildlife criteria #9 (Threatened or Endangered Species), #10 (State Threatened or Endangered Species), #12 (Bald and Golden Eagle Migration or Wintering), #13 (Falcon Nest), and #15 (State Species of High Interest) were found to have no effect on the suitability of the PRLA's or competitive coal lease tracts to be mined.

The following criteria have been applied and affect PRLAs and the competitive coal lease tracts. The following is a discussion of these criteria:

Criterion 1 - National Park System, National Wildlife Refuge System, National System of Trails, etc.

TABLE 1-5

PUBLIC LANDS UNSUITABLE FOR SURFACE COAL MINING

Criterion	PRLA	Competitive Coal Tracts
#2 (Rights-of-way easements or surface leases)	No Effect	A total of 160 acres (an existing emergency coal lease to Carbon Coal Company) in the Gamerco #1 (Bypass) Tract is unsuitable.
#3 (Residential, Community)	No Effect	A total of 480 acres (160 acres located within the City of Gallup in the Hogback Tract and 320 acres of the Pinehaven Subdivision in the Pinehaven Tract) are unsuitable.
#4 (Wilderness Study Areas)	A total of 320 acres of NM-11916 fall within the Bisti WSA, and 5,355 acres of NM-6804, NM-3919, NM-3918 fall within the Ah-shi-sle-pah WSA. a/ A total of 7,749 acres of NM-6801, NM-3834, and NM-3838 overlap the De-na-zin WSAs where underground mining is allowed with no surface facilities or subsidence.	No Effect
#7 (Cultural Resources)	No Effect	A total of 520 acres (440 acres for Basketmaker III, Pueblo I, and Chacoan sites in the Crownpoint NE Tract and 80 acres pending further studies for an historic battleground in the Bisti #1 Tract) are unsuitable.
#11 (Golden Eagle)	No Effect	A total of 355 acres for two nests and their buffer zones fall within the Johnson Trading Post and Nageezi Tract.
#13 (Prairie Falcon)	A total of 160 acres for one nest existing within NM-3834 (refer to Appendix A-7).	No Effect
#14 (Ferruginous Hawk)	A total of 1,945 acres for five nesting sites exist within NM-3835, NM-3919, NM-3834, NM-11916 (refer to Appendix A-7).	A total of 115 acres of one nesting site occur within Bisti #4. (refer to Appendix A-8).

Note: a/ The BLM has requested preliminary final showing information from the holders of all PRLAs, including those that overlap the Ah-shi-sle-pah WSA. However, no leases will be issued until after a final decision is reached on the status of this WSA.

Portions of the Continental Divide National Scenic Trail study corridor is routed through or adjacent to the Star Lake West #2, Gallo Wash #1, Hospah #1, Star Lake #1 or Johnson Trading Post tracts. The actual treadway for the Continental Divide National Scenic Trail has not been established. In view of this situation, this criterion does not require the proposed study corridor to be designated as unsuitable for surface coal mining.

Criterion 2 - Federal lands within rights-of-way or easements or within surface leases for residential, commercial, industrial or other public purposes.

Existing leases (rights-of-way, easements, etc.) are unsuitable for competitive coal leasing. Application of this criterion affects acreage in the Gamerco #1 (Bypass) tract (refer to Table 1-5).

Criterion 3 - Federal lands affected by Section 522 (e) (4) and (5) of the Surface Mining Control and Reclamation Act of 1977.

Lands within 100 feet of a cemetery or public road, or within 300 feet of a community , or occupied dwelling are unsuitable for surface coal mining. This criterion affects acreage in the Hogback and Pinehaven tracts (refer to Table 1-5).

Criterion 16 - Federal lands in riverine, coastal and special flood-plains (100-year recurrence interval).

The exceptions and/or exemptions of these criteria have been applied to the PRLAs and competitive coal lease tracts, except where noted. Special stipulations will be included in each lease permit to protect valid existing rights. For Criteria 16, special stipulations will be included to ensure that coal mining can be undertaken without substantial threat of loss to people or property. These stipulations will be applicable to all proposed competitive lease tracts.

Criterion 4 - Federal lands designated as Wilderness Study Areas (WSAs).

Wilderness Study Areas are unsuitable for surface coal mining and no surface facilities or subsidence are allowed for underground mining. This criterion does not affect any of the competitive coal tracts, but it does affect seven PRLAs (refer to Table 1-5).

Criterion 7 - Federal lands included in or eligible for inclusion in the National Register of Historic Places.

Correspondence with the New Mexico State Historic Preservation Officer has fully documented National Register eligibility, application of Unsuitability Criterion 7 and exceptions for 304 sites in the competitive coal leasing tracts (refer to Table 1-5). The exception to criterion 7 could not be made for one

property, the location of an historic battle (ground) between the Ute and Navajo Indians. This site would be suitable for surface coal mining pending further study.

Supplemental inventories, following completion of the draft EIS, located an additional 264 sites (293 components) in the competitive coal leasing tracts (See Appendix A-11). These sites plus 51 previously recorded sites on Indian trust surface, were the subject of meetings among the BLM, BIA, and New Mexico State Historic Preservation Officer in July 1983. Agreement was reached among all parties concerning National Register eligibility and application of Unsuitability Criterion 7 and exceptions. It was determined that 440 acres in the Crownpoint NE tract would be considered unsuitable for coal mining based on Criterion 7 (refer to Table 1-5).

As provided by the exception to this criterion [after consultation with the State Historic Preservation Officer (SHPO)], surface coal mining operations on tracts with identified sites will be allowed. However, this mining will be allowed only after the lessee carries out measures to avoid adverse impacts to the significant sites, in accordance with a mitigation plan approved by the BLM.

Further, all of the subject lands will be required to be inventoried for cultural resources. Consultation between the BLM and the BIA, OSM, and SHPO, will occur to determine if located sites are eligible for inclusion on the National Register of Historic Places. If adequate mitigating measures cannot be devised for these sites, the sites (and appropriate buffer zone) would not be surface mined.

Criterion 11 - Active bald or golden eagle nest or site on Federal land.

Criterion 13 - Federal lands which contain falcon nests.

Criterion 14 - Federal lands which are high priority habitat for migratory bird species of high Federal interest.

After consultation with the FWS, Criterion 11 has been found to affect two competitive coal tracts, Criterion 13 affects one PRLA and Criterion 14 affects four PRLAs and two competitive coal tracts (refer to Table 1-5).

SURFACE MINE RECLAMATION

Each surface tract would be developed under a mine plan. Because these mines would disturb and reclaim areas in stages, only part of the potential mining area would be disturbed annually. Table 1-6 lists the acreage disturbed (by tract) and maximum area of land unreclaimed during the

TABLE 1-6

ACREAGE DISTURBANCE BY SURFACE MINES AND FACILITIES
DURING VARIOUS STAGES OF THE MINING SEQUENCE

Tracts	Annual Disturbance from Mining	Unreclaimed Mined Lands By Year[a]	Disturbance from Facilities [b], [c]	Maximum Unreclaimed Lands[d]
Underground (Average)	0	80	80	80
Surface Mine (Average)	78	234	100	334
La Plata #1	40	120	50	170
Star Lake West #2	65	195	100	295
Kimbeto #2	35	105	50	155
Gallo Wash #1	67	201	100	301
Bisti #6/8	40	120	50	170
Lee Ranch East	24	72	50	122
Lee Ranch Middle	148	444	200	644
Lee Ranch West	188	564	200	764
Divide	75	225	100	325
Hospah #1	80	240	100	340
Gamerco #1 (HC)	7	24	50	75
Bisti #4	60	180	100	280
Johnson Trading Post	86	258	100	358
Star Lake East #1	70	210	100	310
Bisti #1	89	267	100	367
Bisti #2	32	96	100	346
Catalpa Canyon	40	120	50	170
Sundance	23	69	50	119
Samson Lake #2/2	8	21	50	71
La Plata #3	16	48	50	98
Crownpoint Northeast	206	618	200	818
Crownpoint East (H/LC)	261	783	200	983
Chico Wash South	148	444	200	644
Hogback	43	129	50	179
Twin Buttes	250	750	200	950
Pinehaven	29	87	50	137
Bread Springs #1	6	18	50	68
Gamerco #1 (LC)	4	12	50	62

Notes: [a] Assumes 3-year period from initial disturbance by mining operations to establishment of vegetation cover.

[b] Continues through life of mine; shows average acre need for onsite and offsite facilities.

[c] These figures are predicted upon information on surface disturbance acreage from surface mines in the Uinta-Southwestern Utah and Bisti-Star Lake EIS, and from the Lee Ranch, Mentmore, and Star Lake Mine plans. Estimated acreage for on site and offsite facilities are as follows:

[d] Maximum area that would be unreclaimed at any one time.

Annual Mine Surface Disturbance	Acres Needed for Facilities
0-50 Acres	50
50-100 Acres	100
>100 Acres	200

reclamation sequence. It is assumed that areas disturbed for underground mines and facilities would remain unreclaimed for the life of the mine, although reclamation would be required after facilities were removed.

Vegetation would be established within 3 years on the acreage initially disturbed by mining. This does not imply that a total return to original vegetation would occur in that time period, but vegetation cover sufficient to retard wind and water erosion of soil would be established (J.A. Ferraiuolo and J.C. Bokich, 1982). Depending upon the original vegetation type on each tract, restoration to original conditions could require a much longer period of time (5 to 30 years or more).

A detailed surface mining and reclamation plan based on permanent program performance standards for surface mining (30 CFR 816) must be submitted to and approved by the State of New Mexico's Mining and Minerals Division, New Mexico Energy and Minerals Department in cooperation with the federal Office of Surface Mining (OSM). A site-specific environmental analysis of the mine plan will be prepared by the OSM. The State of New Mexico will then issue a permit to mine, but only if the lessee can show that revegetation is economically and technologically feasible on the particular land proposed to be mined. They will oversee the reclamation work with the cooperation of BLM.

The BLM also develops special reclamation requirements included in federal coal leases and in mining and reclamation plans. These special requirements are related to the management and protection of all resources other than coal, and to the post-mining land uses of the affected public lands.

Revegetation

The proposed action requires each lessee to return lands disturbed by surface mining to a condition capable of supporting pre-mining uses and to establish on the disturbed lands a diverse, effective and permanent vegetative cover capable of plant succession and of at least equal extent to the pre-mining cover. Introduced species may be used in some cases. This section discusses the general or qualitative effects related to revegetation. The discussion for the alternatives presents a quantitative view.

The process of achieving the required revegetation includes three major series of tasks. The first series of tasks requires the lessee to identify soil characteristics and to determine which soil horizons or other material are suitable for use as a growth medium, to protect and segregate those materials during mining, and to replace them over the disturbed area in a depth sufficient to support plant growth.

The second group of tasks requires identification of pre-mining vegetation communities, soil profiles, and microclimates to determine what revegetation techniques must be used. The techniques best suited to each area can then be determined through the use of test plots which allow experimentation on soil recomposition, seed ratios, irrigation techniques, and mulching before mining takes place. The plots help both to determine whether revegetation is technologically feasible for the area and to provide guidance on optimum revegetation techniques.

The third series of tasks is the actual planting of seeds and promoting of growth of the plant community on the lands to be revegetated. A lessee is required to make an initial planting and to make supplemental planting as needed to meet his revegetation obligations. The lessee remains fully responsible for revegetation success for 10-15 years after it last adds seed, fertilizer, or irrigates the land. Reclamation costs are considered in setting the bond a lessee must post prior to mining.

Over the past 20 years, the coal industry has gained considerable experience with revegetation in the San Juan Basin and other comparable lands in the western United States. Initially, experts regarded revegetation success here as difficult to achieve, and, in fact, initial efforts in the San Juan Basin were not highly successful. Since those early efforts, the coal industry, research by state and federal agencies, and agricultural universities have developed a regime, that with site-specific modification, has shown good revegetation results. The steps generally being followed are: identification and placement of suitable growth medium, planting of native vegetation in proper seed ratios, and use of mulch and supplemental irrigation where water of adequate quality is available.

Based upon the limited, but encouraging results exhibited by current reclamation procedures in the San Juan Basin, the Bureau at this time does not feel a need to designate any of the subject lands unsuitable for coal mining because of reclamation concerns. All of the PRLAs and competitive coal tracts will receive a site specific determination on the mine plan regarding their reclamation potential before mining occurs.

MAJOR ISSUES

As a result of public comment during the scoping and consultation process for this EIS, a number of specific issues have surfaced. The following sections give a brief overview of the major issues of public concern; these issues are discussed in greater detail in Chapters 2 and 3.

Air Quality

The major issues concerning air quality are the potential increase in total suspended particulates (TSP) over federal and state ambient air quality standards, and the general degradation of air quality over the Chaco Culture National Historical Park.

Water Resources

Questions and concerns about water quantity and quality were major points of discussion. Numerous participants stated that the San Juan River was currently over-allocated, and any additional water use could have severe impacts to downstream users. The alternative of using ground water or water from uranium mines was also a controversial topic. Potential adverse impacts from ground water drawdown were described, as well as a fear that water from uranium mines would not be adequately treated and radionucleides could be introduced to plants and their environment. Numerous questions were also raised about possible impacts to water quality caused by acid deposition from the proposed plants, coal mine runoff, and other activities in the area.

Soils and Reclamation

Reclamation concerns centered around whether or not the subject lands could be reclaimed, and if so, whether or not the time frames and costs involved in reclamation are reasonable. Many individuals felt that the mined lands could never be reclaimed to their former production capabilities. Livestock productivity is a spin-off of this central issue, as are water quality and erosion in the Region. Some impacts on these resources will depend upon the success of revegetating the reclaimed land.

Paleontology

Members of the scientific community and the general public expressed concern about the loss of significant fossils and information from the mined areas. Other individuals of the community felt that mining would allow for the extraction of scientific data that would not be available if mining did not occur. It is felt that the loss of potentially significant information would be far greater than the information gained from coal mining.

Cultural Resources

Numerous comments were received expressing concern over the destruction of uninventoried archaeological sites, vandalism, and the collection of artifacts because of the ease of access to the sites in the region. Concerns also centered around the possible destruction of structures within Chaco Cultural National Historic Park, some Chacoan Outliers, and uninventoried structures due to blasting.

Recreation, Wilderness, and Visual Resource Management

It was felt that mining and associated activities would be detrimental to the visual quality of the region. Further, these activities would distract from the the quality of experience in the Wilderness Study Areas (WSAs), and limit the recreation opportunities in the badlands close to, and overlying the coal tracts. Noise would be especially distracting to visitors participating in these activities.

Wildlife

Major issues surfaced concerning the destruction of habitat and nesting sites for golden eagles, ferruginous hawks, and prairie falcons (species of high federal interest) by mining and related activities. Concern was also expressed regarding destruction of deer and elk winter range, increased road kills, and illegal shooting of these animals. Of additional concern was reclamation of wildlife habitat values, secondary impacts to fish and wildlife resulting from increased population, consequent social and economic developments, and mining impacts to intermittent and perennial aquatic habitats.

Transportation and Rights-of-Way

The issues concerning transportation center on the increased demand on the existing network of roads caused by mine and facility development. The corresponding increase in road maintenance costs, design problems, and potential for conflicting use are also topics raised. Other issues include how the

location of transmission lines, pipelines, and other utility corridors would affect existing land practices and the region's visual quality (landscape character).

Social and Economic Factors

Public Revenues and Costs

The main issue raised here is whether or not local governments can handle the rapid population growth associated with facility construction and mining, and the pressures that this type of rapid growth will put on public services. In general, public revenues lag behind public costs by 2 to 3 years during periods of rapid economic development. Costs generated by population growth often exceed the revenues in the first few years of development, creating funding issues that can be difficult to resolve.

Inflation

Short-term inflationary pressure from economic developments is a major issue that is most likely to occur in smaller, less developed trade areas. In these locations the increases in demand for housing, food, clothing, and other needs, strain the local supply or distribution systems. However, long-term inflationary impacts would also be an issue because an operations work force would be located in an area for the 30- to 40-year life of the mine, and individuals not sharing in the economic benefits of development would be at a relative disadvantage in competing for goods and services.

Lifestyle Changes

The basic issue concerning the lifestyle of small communities is the long-term social changes that will occur in conjunction with coal development. The change in the power and economic base of affected communities, with ranching losing some of its dominance to industry, is also an issue. However, this may be offset by the increase in local employment opportunities and the reversal of the trend of outward migration from many small communities. Another issue is the perceived impact to public health and safety from air and water pollution associated with coal development facilities.

American Indian Concerns

Many of these issues centered around impacts to American Indian lifestyle and were similar to the issues discussed above. Other concerns surfaced regarding the hindrance of religious practices through the destruction of sacred sites, gathering areas, and graves. One of the major issues in this EIS is the relocation of occupants; how, when, where, and what are the social implications of the relocation of a people with a traditional lifestyle. The loss of grazing privileges over an extended period of time is also a major concern because grazing of small herds and flocks is a part of the lifestyle of the Navajo people.

INTERRELATIONSHIPS WITH OTHER PROJECTS IN THE REGION

In addition to the proposals analyzed in this EIS, several other actions are pending before the BLM that could be approved. (See the Cumulative Overview for discussion of the New Mexico Generating Station and Proposed Wilderness Areas EIS).

Navajo Land Selection (Navajo-Hopi Relocation)

The first of these actions is a selection that the Navajo Tribe has made of 35,000 acres of public lands (refer to Appendix A-9 for a list of these lands). The selection seeks both the surface and mineral estates under Section 11 of the Navajo Hopi Relocation Amendments Act of 1980 (P.L. 96-305), which allows the Navajo Tribe to select up to 250,000 acres of public land within 18 miles of the current reservation boundary. It is not clear whether or not mineral estates will be transferred with the selection. Up to 35,000 acres of this land can be in New Mexico. The purpose of the selection is to provide a residence area for Navajos relocated from lands in Arizona as part of this settlement of a land dispute between the Hopi and Navajo Indian Tribes. The selection itself is exempt from the environmental requirements of the National Environmental Policy Act of 1969. This selection is currently under active consideration between the Navajo Tribe, Arch Minerals, PNM, and the Department of the Interior.

The interest conveyed by the PRLA's may not be transferred as part of the selection. If so any leases issued would be administered by the BLM and all revenues would be distributed under the Mineral Leasing Act.

Should the selection be approved, the Navajo Tribe could allow development to proceed as proposed by PRLA holders, or the Navajo Tribe could begin an active relocation program that could delay or interfere with proposed surface coal mining operations, greatly reducing mining and its related impacts. Competitive coal lease tracts would not be affected by this action.

Santa Fe Exchange

The second pending action is Santa Fe Pacific Railroad Mining Company's proposal to exchange the fee coal interests it owns for coal owned by the United States. Both the United States' and Santa Fe's coal interests are within the lands currently delineated as the Lee Ranch West, Middle, and East tracts and the Divide tract located in the southern part of the EIS Region with the exception of 7 sections of Santa Fe's lands that lie outside the competitive tracts. The coal in these tracts is owned largely in a checkerboard pattern with the United States owning the odd numbered sections and Santa Fe owning the even numbered sections.

Santa Fe's proposal is to consolidate its coal ownership in the Lee Ranch Middle tract, while the United States would consolidate its ownership in the Lee Ranch East, West, and Divide tracts. The purpose would be for a desirable and more competitive tract to be leased. (Maps of this proposal are on file in the Albuquerque District and Farmington Resource Area Office). The

exchange would be and equal value exchange as allowed by Section 206 of the Federal Land Policy and Management Act of 1976.

Because this proposal was made so late in the writing of this EIS, a full review of its effects has not been completed but an EA will be made available shortly after the final EIS is filed. Preliminary analysis does not show any significant environmental differences between leasing as proposed and leasing under the exchange because the same lands would be available for development under generally the same environmental protection provisions.

Ute Mountain Exchange

Another proposal involves a total of 1,690 acres of surface estate on two PRLAs (NM-3752 and NM-3754) and two competitive lease tracts (Nageezi and Bisti 6/8). These acres are included in the Ute Mountain Exchange Withdrawal (Federal Register Vol. 47, No. 43 Thursday, March 4, 1982). The Ute Mountain Withdrawal reserves the public lands for use in a proposed surface estate exchange between the Public Service Company of New Mexico (PNM) and the BLM. The withdrawal segregates the public lands from the operations of public land laws and the general mining laws. A period of 2 years from the publication of the withdrawal in the Federal Register is allowed for consummation of the surface exchange. Impact analysis for this proposed exchange can be found in the Final Ute Mountain Land Exchange Environmental Assessment (USDI, BLM 1981) and in the NMGS EIS. Consummation of this action will not preclude development of PRLA's or the proposed competitive coal lease tracts.

Navajo Exchange Withdrawal

A total of 400 acres of the competitive lease tracts are within the Navajo Exchange Withdrawal. The Navajo Exchange lands were withdrawn on September 2, 1980 by Public Land Order (P.L.O.) 5721, published in the Federal Register (Vol. 45, No. 87, pages 29295-29297). P.L.O. 5721 withdrew 67,000 acres of public land, reserving them for use in a proposed surface estate exchange between the BLM and the Navajo Tribe. These lands were withdrawn from settlement, sale, location, or entry under the general land laws and the mining laws until consummation of the exchange. Legislation has been passed (October, 1982) to transfer the public land to the Navajo Tribe. Impact analysis for this proposed exchange can be found in the Final Environmental Assessment Record on Proposed Navajo Land Exchange (USDI, 1978). Consummation of this action will not preclude development of PRLAs or the proposed competitive coal lease tracts.

Bisti Coal Lease Exchange

The entire Bisti #1 Tract (approximately 3,713 acres) is under the Bisti Coal Lease Exchange. Public law 96-475 (94 Stat. 2269), dated October 19, 1980, authorized the Secretary of the Interior to issue coal leases within the Bisti #1 Tract upon relinquishment of the leases or portions of leases located within the Bisti Wilderness Study Area. Following the enactment of this act, 30 months are allowed for completion of the lease exchange. As yet no decision has been made. Impact analysis for this proposed exhange can be found in the Draft Bisti Coal Lease Exchange Environmental Assessment (USDI, BLM 1981).

Navajo Litigation

The Navajo Tribe recently filed a lawsuit in the District Court for New Mexico, Navajo Tribe of Indians v. State of New Mexico, Civ. No. 83-1148-JB, in which the Tribe claims title to 2.1 million acres of land in northwest New Mexico. The suit claims virtually all the lands and minerals which the Bureau is proposing to lease. If the suit is successful, the lands and interests covered by the suit would be made a part of the Reservation. Title to the lands and minerals would be held in trust by the United States on behalf of the Navajo Tribe. In that case, the current proposals (Preference Right Lease Issuance and competitive coal tracts) would have to be dropped entirely.

The United States, the State of New Mexico, and others have filed motions to dismiss the lawsuit on a number of grounds. The existence of the litigation and its possible effect on the proposed actions will be considered in the decision making process for these proposals.

COMPARISON OF THE IMPACTS OF THE ALTERNATIVES AND PRLA'S

Table 1-7 summarizes the impacts from mining the 26 PRLAs and PRLA alternatives and the other projects that are part of the No Action Alternative (existing and proposed leases and mines under contract commitments or mine plans, and major federally approved projects).

This section discusses those resource values that would be significantly impacted by coal mining under each of the competitive lease alternatives. Table 1-8 gives the magnitude of these impacts by alternative. The alternatives would produce impacts generally commensurate with the amount of coal produced. The alternatives differ very little from one another by the nature of their impacts. They differ mostly in the magnitude of the impacts they would produce. The cumulative impacts of new federal coal leasing would be the impacts of a particular alternative added to the impacts of the No Action Alternative which includes Preference Right Lease Issuance. Impacts that are shown in the table are attributable solely for a particular alternative.

Air Quality

Air quality impacts would occur under the No Action Alternative and Preference Right Lease Issuance but air quality standards would not be exceeded. However, by adding the additional tracts of the Bypass Alternative, worst-case analysis shows cumulative impacts would cause New Mexico's 24-hour ambient air standards to be slightly exceeded. With the addition of the tracts under the Minimum Surface Owner Conflicts (MSOC) Alternative, this standard could be significantly exceeded (by 84 ug/m^3). Additional mining on the tracts of the Target and High Alternatives would show very little increase over the MSOC Alternative. However, air quality standards generally would not be allowed to be exceeded. If conditions exist that the standards would be exceeded then the mines would be required to shut down or cut back production to be in compliance with the air quality standards.

Topography, Geology, Mineral Resources

Each alternative shows a marked increase in the total number of acres of land disturbed and coal removed, as a result of mining. The numbers nearly triple from the Bypass to MSOC Alternative, and double from the MSOC to the Target and from the Target to the High Alternative.

Paleontology

The development of coal could result in the destruction of important fossil localities. However, some members of the academic community feel that mining would allow for the extraction of scientific data that would not be available if the tracts are not mined. Population increases and access to EIS Region would result in unauthorized collection and vandalism. The Bypass Alternative would disturb an estimated 570 important fossil localities. While the number of localities disturbed would nearly triple under the Target Alternative, the MSOC Alternative would affect only 136 fossil localities.

Soils

Surface disturbance would temporarily disturb significant numbers of acres under each alternative. The acreage removed from production by facilities construction would result in long-term productivity loss. On the acreage being disturbed by surface mining, short-term acceleration of erosion and increase sediment yield would result. Soil mixing, contamination, and compaction would occur during mining operations.

Water Resources

With each alternative the mining process would utilize increasing quantities of ground water per year. The largest increase is between the Bypass and the Target Alternatives. With this increased water usage, greater declines of water levels in particular aquifers, would occur. Degradation of the quality of shallow ground water may occur. Recharge to shallow aquifers would be decreased locally. An additional concern relates to the possible decrease in water quality caused by acidic deposits from the proposed plants, coal-mine runoff, and other activities associated with the development of coal.

Vegetation, Livestock Grazing, and Livestock Improvements

Short term loss of vegetation (and therefore forage for livestock and wildlife) would generally occur over the life of each mine (20 to 40 years) or until reclamation occurs..

All lands affected by coal mining would be legally required, after mining, to be returned to their approximate original contour and vegetative productivity. Revegetation effort on coal mines in similar areas indicate that mined lands in the EIS Region can be successfully revegetated with proper selection or conditioning of soils and irrigation. However, it should be noted that no lands have been through a full revegetation cycle and returned to grazing use.

Other areas for livestock grazing could be found for Navajo families who would lose their grazing areas while mining is being conducted and until reclamation takes place.

Temporary loss of any grazing areas would be a significant impact unless another area is found, or unless the family is reimbursed for the loss. The full impacts of this situation are hard to predict at this time.

The Bypass Alternative would have the least amount of impact, while the impacts would increase to a much greater extent under the MSOC Alternative. The loss of vegetation acreage nearly doubles from the MSOC to the Target Alternative and then again to the High Alternative, but the increase in loss of forage (AUM's) is only moderate.

The Target and High Alternatives also encompasses the known habitat of state-sensitive species Astragalus wingatus.

Wildlife

Mining would cause the disturbance and destruction of wildlife populations and habitat. The impacts would become more serious as more coal is mined, more habitat is destroyed, and human activity increases in the Region. Comparing the alternatives, the estimated acreages that would be removed from wildlife utilization during the mine life shows substantial increases. Disturbances could occur on 200 to 300 acre of mule deer and elk winter range. The ferruginous hawk (a species of high federal interest), the prairie falcon, and golden eagle, and their possible nesting areas, would be impacted by surface mining; however no new destruction to these species would occur under the MSOC Alternative.

Cultural Resources

The types of cultural resource impacts caused by mining are: possible destruction of uninventoried archaeological sites, vandalism and collection of artifacts due to ease of access into the EIS Region, and possible destruction of portions of the Chacoan roadway system. However, over the past 2 years the Bureau has completed indepth studies on the Chacoan Roads and have extracted a great deal of information about these roads thus having, for the most part, mitigated these sites. Each alternative shows an increase in the number of sites destroyed or disturbed by mining.

Site excavation and other forms of data recovery before mining would result in increased knowledge about past cultures in the EIS Region. However, some sites may have regionally significant values that require special attention in order to preserve important scientific information. Cultural surveys have identified four areas where cultural resources require protection in situ. If other such resources are found, provisions in the lease stipulations will allow for these sites to be preserved in-place. While the Chaco Culture National Historical Park is nearby, mining would not occur in the park itself nor is it expected that mining would directly adversely affect structures in the park. Studies are being conducted on nearby lands to determine the affects of blasting within the park.

Visual Resources

Mining, construction, and use of related facilities would result in reductions in scenic values. The number of acres disturbed, and thus the impacts on scenic values, would increase under each alternative. Another impact

would occur to the Continental Divide National Scenic Trail corridor. In the Bypass, Target and High Alternatives, impacts would occur to a significant number of acres in the Bisti Badlands (outside of the Bisti WSA). No impacts would occur to the Bisti Badlands under the MSOC Alternative.

Wilderness

Mining and associated activities would detract from the naturalness, solitude and visual quality of the EIS Region. Noise would also be disturbing, especially when individuals hope to find a quality wilderness experience.

Recreation

Impacts on dispersed recreational activities and developed sites would include pressures from an increse in population and the extraction of land from recreation use by mining operations. It is felt that sufficient dispersed recreational activity areas and the currently developed sites are adequate to handle the increase in use expected from mining and related activities without substantial overcrowding. Mining activity would be visually distracting and noise pollution would have a detrimental effect on the recreation experience. The impacts to recreation would be commensurate with the level of mining under each of the four alternatives.

Land Uses

Land use impacts would involve the removal or relocation of transmission lines, pipelines, powerlines, roads, and railroads. A tremendous increase in the acreages of right-of-ways affected would occur between the Bypass and the Target Alternatives. Acreage affected would more than double between the Target and the High Alternatives.

Transportation

The impacts on transportation involve increases in the number of accidents, the amount of daily traffic, the demand for new road construction and road maintenance, and the potential for conflicting uses between mining operations, facilities developement, and the general public.

The alternatives show that the increase in the number of accidents would be minimal under the Bypass and the MSOC Alternatives. However, more than 36 additional accidents would occur under the Target Alternative and that number would double under the High Alternative. The Average Daily Traffic (ADT) increases in the year 2000 show a large increase between the Bypass and the Minimum Surface Owner Conflict Alternative while the other alternatives show only a slight ADT increase.

Social and Economic Factors

If full development occurs under the No Action Alternative and Preference Right Lease Issuance, it could displace use by Navajo families in the rural part of the EIS Region for livestock grazing. Because coal mining has the potential to foster other industrial development this rural portion of the EIS region will probably see a trend toward industrial development. This could significantly affect the off reservation Navajo lifestyle.

Population would increase in proportion to the levels of coal development, as would available jobs, and the need for infrastructures and community expansion. Other problems associated with large influxes and sharp increases in population would dramatically increase with higher levels of coal development. This would largely affect the small communities in the EIS Region. Farmington has experienced much of this type of impact already due to the oil and gas industry. It has adjusted to these changes and would only be slightly affected by new federal coal leasing.

American Indian Concerns

Residences

One of the major issues for this EIS is the relocation of the American Indian families occupying the PRLA area and adjacent competitive tracts. The social implications involved in relocating these people of traditional life styles are of concern. Every alternative would affect a certain number of known Navajo occupants, the largest increase occurring between the Target and High Alternatives.

Gravesites

In keeping with the Navajo tradition, the belief in witchcraft resulting from the disturbance of gravesites during surface mining could have an affect on Navajo health and behavior. Under each alternative, a number of grave sites in surface mining areas could be destroyed, if not identified and removed (removal constitutes a disturbance) before mining. Gravesite disturbance will be minimized by requiring each lessee to survey the lease for gravesites and to avoid mining within 100 feet of a gravesite unless the gravesite is lawfully relocated.

Sacred Sites

American Indian sacred sites should be identified before they are destroyed by mine facility construction. Mining operations could be a hindrance to religious practice due to population increases, noise, vibration, and dust. Each alternative would affect a number of sacred sites, with the High Alternative affecting the largest site number. These impacts could be minimized through ceremonies conducted by local medicine men.

TABLE 1-7

COMPARISON OF IMPACTS FOR PRLA ALTERNATIVES

Resource	No Action/Exchange PRLAs [a]	Preference Right Lease Issuance	Partial Lease Issuance
Air Quality [b] (New Mexico State TSP 24-hour Ambient Air Quality Standard is 150 ug/m^3	No significant impacts.	Approximate TSP concentration is 100 ug/m^3.	Approximate TSP concentration is 100 ug/m^3.
Topography, Geology, Mineral, Resources	Alteration of topography on 25,000 acres. Some subsidence would occur during subsurface mining. Removal of up to 600 million tons of coal.	Alteration of topography on 22,020 acres. Some subsidence on up to 30,000 acres. Removal of up to 1.15 billion tons of coal.	Alteration of topography on approximately 15,435 acres. Some subsidence on approximately 28,270 acres. Removal of approximately 1.02 billion tons of coal.
Paleontology	An estimated 1,100 fossil localities could be destroyed by construction of mining-connected facilities. Population increases and increased access to the region would result in unauthorized collection and vandalism. However, during mining subsurface information would become available.	An estimated 1,137 fossil localities would be destroyed by construction of mining connected facilities. Other impacts are the same as under the No Action Alternative.	An estimated 1,076 fossil localities could be destroyed by construction of mining facilities. Other impacts are the same as the No Action Alternative.
Soils	About 1,000 acres removed from production by facilities construction, resulting in long-term productivity loss. Over 25,000 acres disturbed by surface mining with short-term acceleration of erosion and sediment yield resulting. Soil mixing, contamination and compaction would also occur.	Over 22,020 acres disturbed by surface mining with short-term acceleration of erosion and sediment yield resulting. With about 705 acres removed from production by facilities construction, resulting in long-term productivity loss. Soil mixing, contamination and compaction would also occur.	Approximately 15,435 acres would be disturbed by surface mining with short-term acceleration of erosion and sediment yield resulting. Approximately 515 acres could be removed from production by facilities construction, resulting in long-term productivity loss. Soil mixing, contamination and compaction would also occur.
Water Resources	Disruption of aquifers and destruction of shallow ground water sources, less recharge to ground water, 3,600 acre-feet of water per year in 1987 and a peak-use in the year 2000 by mining companies of 7,825 acre-feet of water per year. Destruction of existing surface drainage patterns in mined areas.	Approximately 12,850 acre-feet of water per year used during mining process. Other impacts the same as under the No Action Alternative.	Approximately 12,275 acre-feet of water per year used during mining process. Other impacts the same as under the No Action Alternative.
Vegetation	Removal of vegetation on approximately 25,000 acres.	Removal of vegetation on aproximately 22,600 acres.	Removal of vegetation on approximately 15,435 acres.
Livestock Grazing and Improvements	Yearly vegetative production on 25,000 acres disturbed estimated at 3,157 AUMs. Short-term annual AUM losses cannot be predicted until mine plans are submitted. Vegetative yield should return to or near full production in the long term.	An estimated 2,032 AUMs lost with 10 dirt reservoirs, 4 wells, 3 cattleguards, 2 corrals, 2 wells, 2 windmills, and 20.5 miles of fence destroyed.	An estimated 1,778 AUMs lost. Other impacts are the same as identified under the No Action Alternative.
Wildlife	Surface mining to exclude about 25,000 acres from use by wildlife until after reclamation. Indirect impacts on wildlife due to increased human activity in region.	An estimated 22,020 acres removed from wildlife utilization during mine life. Possible disturbance to a raptor of high federal interest, 5 ferruginous hawks and 1 prairie falcon. Other imapcts are the same as under the No Action Alternative.	Approximately 15,435 acres removed from wildlife utilization during mine life. Other impacts are the same as identified under the No Action Alternative

TABLE 1-7 (CONTINUED)

Resource	No Action/Exchange PRLAs	Preference Right Lease Issuance	Partial Lease Issuance
Cultural Resources	Other projects may destroy between 470 and 950 sites within the coal region. Site excavations and other forms of data recovery prior to mining would result in increased knowledge about past cultures in the region, although timeframes could affect the quality of data recovered. Unmitigated sites and Chacoan roads in surface mining areas destroyed. Mining-related activities and population increases would accelerate damage.	A total of 171 sites identified throughout the PRLA area and 542+ predicted. Other impacts the same as under the No Action Alternative.	Four-hundred and thirty-four sites are predicted to occur. Other impacts are the same as under the No Action Alternative.
Visual Resources	Mining, construction, and use of related facilities would reduce the scenic values on 25,000 acres during a period of 20 to 40 years and longer.	An estimated 22,020 acres would be affected in the same way as under the No Action Alternative. Impacts would occur to the Continental Divide National Scenic Trail corridor.	An estimated 15,435 acres would be affected in the same way as under the No Action Alternative. Impacts could occur to the Continental Divide National Scenic Trail corridor.
Wilderness	Mining and associated activities would detract from the quality of the wilderness experience due to noise and visual distractions.	Impacts the same as under the No Action Alternative.	Impacts the same as under the No Action Alternative.
Recreation	Increased demand for recreation in the region, increased pressures on outside recreation areas due to population increase, and extraction of land from recreation use due to mining operations. Mining activities would detract from the quality of the recreation experience due to noise and visual impacts.	Impacts the same as under the No Action Alternative.	Impacts the same as under the No Action Alternatives.
Land Use	Removal or relocation of an unknown number of rights-of-ways, including roads, powerlines, pipelines, transmission lines and railroads.	An estimated 379 acres affected; type of impacts the same as under the No Action Alternative.	Impacts the same as under the No Action Alternative.
Transportation	Increases in accidents, daily traffic, road maintenance, and new road construction. Accidents increased by more than 2 and Average Daily Traffic (ADT) by more than 387 by the year 2000.	Accidents increased by more than 89 and ADT by more than 4,190 in the year 2000.	Impacts the same as under the PRLA Alternative.
Social and Economic Conditions	Population could increase by 13,738 people (25%) in Farmington in 1987 over the 1980 base population and 361 people (59%) in Cuba in 1987. Total employment could increase by up to 764 jobs (12%) in Crownpoint-Thoreau area in 1987 to 313 jobs (60%) in Cuba in 1987. In the year 2000 an increase of 933 jobs (27%) could occur in Crownpoint-Thoreau area and 535 jobs (173%) in Cuba. These figures are above the 1980 base figure.	Population could increase by 1,923 people (116%) in Cuba in the year 2000. Employment could increase by 5,191 jobs (16%) in Farmington and 1,731 jobs (324%) in Cuba in the year 2000. Lifestyles and cultural and religious values for Navajo people living on or near the PRLA's could be disrupted. Expansion of community infrastructures would be necessary.	Impacts the same as under the PRLA Alternative.

TABLE 1-7 (CONTINUED)

Resource	No Action/Exchange PRLAs	Preference Right Lease Issuance	Partial Lease Issuance
American Indian Concerns			
Residences	The number of Navajo American Indian families occupying the area and adjacent land is unknown.	Thirty-nine (39) Navajo American Indian families occupying the PRLA area and adjacent land relocated.	Fourteen (14) Navajo American Indian families occupying the PRLA area and adjacent land relocation.
Gravesites	An unknown number of gravesites in surface mining areas could be destroyed if not identified. Belief in witchcraft occurring due to gravesite disturbance could have a profound effect on Navajo health and behavior.	On 11 known gravesites the lessee would have to get permission to move the gravesites or an area 100 feet surrounding the site could not be mined. The impacts to unknown gravesites would be the same as under the No Action. Alternative	Impacts the same as under the PRLA Alternative.
Sacred Sites	An unknown number of sacred sites could be destroyed by surface mining and facilities construction if not recognized ahead of time. Population increases and noise, vibration, and dust from mining would cause adverse effects.	On 4 known sacred sites impacts the same type as under the No Action Alternative.	Impacts the same as under the PRLA Alternative.

Notes: a/ This assumes that the PRLAs would be exchanged for coal outside the San Juan Basin.
b/ Figures for air quality are cumulative, they include the No Action Alternative.

TABLE 1-8

COMPARISON OF IMPACTS,
COMPETITIVE LEASING ALTERNATIVES [a]

Resource	No Action [c]	Bypass	Minimum Surface Owner Conflicts	Target [d]	High [e]
Air Quality [b] (New Mexico State TSP 24-hour Ambient Air Quality Standard is 150 ug/m^3)	Reduction in visual, range, air quality standard not exceeded.	Could exceed New Mexico State 24-hour ambient air standard by 13 ug/m^3 unless Best Available Technology (BACT) is applied.	Could exceed New Mexico State 24-hour ambient air standard by 84 ug/m^3 unless BACT is applied.	Could exceed New Mexico State 24-hour ambient air standard by 84 ug/m^3 unless BACT is applied.	Could exceed New Mexico State 24-hour ambient air standard by 86 ug/m^3 unless BACT is applied.
Topography, Geology, Mineral, Resources	Alteration of topography on 47,020 acres. Some subsidence on up to 30,000. Removal of up to 1.75 billion tons of coal.	Alteration of approximately 6,130 acres. Removal of approximately 282.0 million tons of coal (113 million tons federal). No subsidence.	Alteration of approximately 19,302 acres. Removal of approximately 702.0 million tons of coal (349 million tons federal). Subsidence on up to 21,000 acres.	Alteration of approximately 35,977 acres. Removal of approximately 1.2 billion tons of coal (696 million tons federal). Subsidence on up to 21,000 acres.	Alteration of approximately 68,641 acres. Removal of approximately 1.65 billion tons of coal (1.09 billion tons federal). Subsidence on up to 37,081 acres.
Paleontology	An estimated 2,237 fossil localities could be destroyed by construction of mining-connected facilities. Population increases and increased access to the region would result in unauthorized collection and vandalism. However, during mining some subsurface information would become available.	An estimated 271 fossil localities disturbed. Other impacts the same as under the No Action Alternative.	An estimated 136 fossil localities disturbed. Other impacts the same as under the No Action Alternative.	An estimated 1,400 fossil localities disturbed. Other impacts the same as under the No Action Alternative.	An estimated 1,693 fossil localities disturbed. Other impacts the same as under the No Action Alternative.
Soils	About 1,705 acres removed from production by facilities construction, resulting in long-term productivity loss. Over 47,020 acres disturbed by surface mining with short-term acceleration of erosion and sediment yield resulting. Soil mixing, contamination and compaction would also occur.	About 6,130 acres disturbed by surface mining, and 600 acres by underground mining and surface facilities. Type of impacts the same as under the No Action Alternative.	About 19,302 acres disturbed by surface mining, and 1,050 acres by underground mining and surface facilities. Type of impacts the same as under the No Action Alternative.	About 35,977 acres disturbed by surface mining, and 2,100 acres by underground mining and surface facilities. Type of impacts the same as under the No Action Alternative.	About 68,641 acres disturbed by surface mining, and 3,500 acres by underground mining and surface facilities. Type of impacts the same as under the No Action Alternative.
Water Resources	Disruption of aquifers and destruction of shallow ground water sources, less recharge to ground water. A peak-use in the year 2000 by mining companies of 20,675 acre-feet of water per year. Destruction of existing surface drainage patterns in mined areas.	Approximately 380 acre-feet of water per year used during mining process. Other imapcts the same as under the No Action Alternative.	Approximately 2,500 acre-feet of water per year used during mining process. Other impacts the same as under the No Action Alternative.	Approximately 3,700 acre-feet of water per year used during mining process. Other impacts the same as under the No Action Alternative.	Approximately 4,650 acre-feet of water per year used during mining process. Other impacts the same as under the No Action Alternative.
Vegetation	Removal of vegetation on approximately 47,020 acres.	Removal of vegetation on approximately 6,130 acres.	Removal of vegetation on approximately 19,302 acres.	Removal of vegetation on approximately 35,977 acres.	Removal of vegetation on approximately 68,641 acres.
Livestock Grazing and Improvements	An estimated 5,189 AUMs lost Short-term annual AUM losses cannot be predicted until mine plans are submitted. Vegetative yield should return to or near full production in the long term. Ten dirt reservoirs, 4 wells and 20.5 miles of fence would be destroyed.	An estimated 603 AUMs lost, with 4 reservoirs and 2 miles of fence destroyed or removed and 1 well.	An estimated 4,268 AUMs lost, with 9 reservoirs and 13 miles of fence destroyed or removed, 6 wells and 1 spring.	An estimated 6,045 AUMs lost, with 15 reservoirs and 31 miles of fence removed or destroyed, 9 wells and 1 spring. State sensitive species Astragalus wingatus impacted.	An estimated 9,977 AUMs lost, with 28 reservoirs, 73 miles of fence and a corral removed or destroyed, 17 wells and 1 spring. State sensitive species Astragalus wingatus impacted.
Wildlife	Surface mining to exclude about 47,020 acres from use by wildlife until after reclamation. Indirect impacts on wildlife due to increased human activity in region.	An estimated 6,130 acres removed from wildlife utilization, and 200 acres of deer and elk winter range disturbed. Possible disturbance of 1 ferruginous hawk and nesting areas.	An estimated 19,302 acres removed from wildlife utilization during mine life. Possible disturbance on 200 acres of wintering mule deer and elk range. Possible disturbance of 1 golden eagle.	An estimated 35,977 acres removed from wildlife utilization during mine life. Possible disturbance on 200 acres of wintering mule deer and elk range. Possible disturbance of 2 golden eagle nests and 2 ferruginous hawks and nesting areas.	An estimated 68,641 acres removed from wildlife utilization during mine life, and 300 acres of mule deer and elk winter range impacted. Possible disturbance of 2 golden eagle nests and 2 ferruginous hawks and nesting areas.

TABLE 1-8 (CONTINUED)

Resource	No Action [c]	Bypass	Minimum Surface Owner Conflicts	Target [d]	High [e]
Cultural Resources	A total of 171 sites identified, with 1,012 to 1,492 sites predicted within the coal region. Site excavations and other forms of data recovery prior to mining would result in increased knowledge about past cultures in the region, although timeframes could affect the quality of data recovered. Unmitigated sites and Chacoan roads in surface mining areas destroyed. Mining-related activities and population increases would accelerate damage.	A total of 28 sites identified, with 165 to 188 sites predicted. Portions of Chacoan roads destroyed. Other impacts the same as under the No Action Alternative.	A total of 213 sites identified, with 600 to 708 sites predicted. Portions of Chacoan roads destroyed. Other impacts the same as under the No Action Alternative.	A total of 412 sites identified, with 814 to 1,105 sites predicted. Portions of Chacoan roads destroyed. Other impacts the same as under the No Action Alternative.	A total of 638 sites identified, with 1,727 to 2,295 sites predicted. Portions of Chacoan roads destroyed. Other impacts the same as under the No Action Alternative.
Visual Resources	Mining, construction, and use of related facilities would reduce the scenic values on 47,020 acres during a period of 20 to 40 years and longer. Impacts would occur to the Continental Divide National Scenic Trail corridor.	An estimated 6,130 acres would be affected in the same way as under the No Action Alternative. Significant impacts would occurto 3,040 acres in Bisti Badlands (VRM Class III - IV).	An estimated 19,302 acres (VRM Class III - IV) would be affected in the same way as under the No Action Alternative.	An estimated 35,977 (VRM Class III - IV) acres would be affected in the same way as under the No Action Alternative. Significant impacts would occur to 4,070 acres in Bisti Badlands.	An estimated 68,641 (VRM Class III - IV) acres would be affected in the same way as under the No Action Alternative. Significant impacts would occur to 4,070 acres in Bisti Badlands.
Wilderness	Mining and associated activities would detract from the quality of the wilderness experience due to noise and visual distractions.	Impacts the same as under the No Action Alternative.	Impacts the same as under the No Action Alternative.	Impacts the same as under the No Action Alternative.	Impacts the same as under the No Action Alternative.
Recreation	Increased demand for recreation in the region, increased pressures on outside recreation areas due to population increase, and extraction of land from recreation use due to mining operations. Mining activities would detract from the quality of the recreation experience due to noise and visual impacts.	Impacts the same as under the No Action Alternative.	Impacts the same as under the No Action Alternative.	Impacts the same as under the No Action Alternative.	Impacts the same as under the No Action Alternative.
Land Use	Removal or relocation of an unknown number of rights-of-ways, including roads, powerlines, pipelines, transmission lines and railroads.	An estimated 13 acres affected; type of impacts the same as under the No Action Alternative.	An estimated 205 acres affected; type of impacts the same as under the No Action Alternative.	An estimated 363 acres affected; type of impacts the same as under the No Action Alternative.	An estimated 811 acres affected; type of impacts the same as under the No Action Alternative.
Transportation	Increases in accidents, daily traffic, road maintenance, and new road construction. Accidents increased by more than 91 and Average Daily Traffic (ADT) by more than 4,477 by the year 2000.	Accidents increased by more than 6, and ADT by more than 310 in the year 2000.	Accidents increased by more than 13, and ADT by more than 2,643 in the year 2000.	Accidents increased by more than 39, and ADT by more than 3,310 in the year 2000.	Accidents increased by more than 64, and ADT by more than 4,397 in the year 2000.
Social and Economic Conditions	Population could increase by 13,738 people (25%) in Farmington in 1987 over the 1980 base population and 2,284 people 175% in Cuba in 1987 by the year 2000 an increase of 933 jobs (27%) could occur in Crownpoint/Thoreau area and 2,266 (497%) jobs in Cuba. Employment would increase by 5,191 jobs (16%) in Farmington. Lifestyles and cultural and religious values for Navajo people living on or near the PRLA's would be disrupted. Expansion of community infrastructures would be necessary.	Population could increase by 1,923 people (116%) in Cuba in the year 2000. Employment could increase by 1,731 jobs (324%) in Cuba in the year 2000. Other impacts would be the same type as under the No Action Alternative.	Population could increase by 2,977 people (15%) in Grants and 2,977 (31%) in Milan in the year 2,000. Employment could increase by 3,070 jobs (10%) in Farmington, by 2,680 (33%) in Grants, and 2,680 (102%) in Milan in the year 2000. Other impacts would be the same type as under the No Action Alternative.	Population could increase by 859 people (52%) in Cuba, and 3,525 (53%) in Milan in the year 2000. Employment could increase by 5,136 jobs (16%) in Farmington, 773 (145% in Cuba, 3,172 (40%) in Grants, and 3,172 (121%) in Milan in the year 2000. Other impacts would be the same type as under the No Action Alternative.	Population could increase by 2,573 people (155%) in Cuba, 4,230 (21%) in Grants, 5,481 (21%) in Gallup, 4,230 (64%) in Milan, and 3,342 (110%) in Crownpoint/Thoreau. Employment could increase by 4,005 jobs (13%) in Farmington, 2,156 (403%) in Cuba, 3,807 (47%) in Grants, 4,454 (56%) in Gallup, 3,807 (145%) in Milan and 3,008 (655%) in Crownpoint/Thoreau. Other impacts would be the same type as under the PRLA Lease Issuance Alternative.

TABLE 1-8 (CONTINUED)

Resource	No Action [c]	Bypass	Minimum Surface Owner Conflicts	Target [d]	High [e]
American Indian Concerns					
Residences	Thirty-nine (39) Navajo American Indian families occupying the PRLA area and adjacent land relocated.	Approximately four Navajo families relocated.	Approximately twenty-three Navajo families relocated.	Approximately seventy Navajo families relocated.	Approximately four-hundred fifty-five Navajo families relocated.
Gravesites	Eleven (11) known gravesites in surface mining areas could be destroyed if not identified and removed before mining. Belief in witchcraft occurring due to gravesite disturbance could have a profound effect on Navajo health and behavior.	On 3 known gravesites, impacts the same type as under the No Action Alternative.	No known gravesites, impacts the same type as under the No Action Alternative.	On 23 to 33 known gravesites, impacts the same type as under the No Action Alternative.	On 25 to 35 known gravesites, impacts the same type as under the No Action Alternative.
Sacred Sites	Four (4) known sacred sites in the PRLA area could be destroyed by surface mining and facilities construction if not recognized ahead of time. Population increases and noise, vibration, and dust from mining would cause adverse effects.	On one known sacred site impacts the same type as under the No Action Alternative.	No known sacred sites, impacts the same type as under the No Action Alternative.	On three known sacred sites, impacts the same type as under No Action Alternative.	On four known sacred sites, impacts the same type as under the No Action Alternative.

Notes: [a] Impacts are attributable solely to a particular alternative or action.
[b] Figures for air quality are cumulative, they include the No Action Alternative.
[c] Assumes the issuance of PRLAs.
[d] The intensity and duration of impacts are greater than that of the No Action Alternative.
[e] The intensity and duration of impacts are greater than that of the Target Alternative.

CHAPTER 2
AFFECTED ENVIRONMENT

CHAPTER 2
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AFFECTED ENVIRONMENT
CHAPTER 3

CHAPTER 2

AFFECTED ENVIRONMENT

INTRODUCTION

This chapter describes the resource components of the environment that would be impacted by the proposed mining of coal on 39 competitive coal lease tracts and 26 Preference Right Lease Applications in the San Juan River Region (also called the "EIS Region"). The level of detail in the descriptions corresponds with the expected magnitude and intensity of the impacts discussed in Chapter 3. Technical material supporting these descriptions and the analysis in Chapter 3 is located in the Appendix of this document, or is on file and available for public review at the BLM Farmington Resource Area Office.

CLIMATE

The major portion of the San Juan River Region is characterized by generally clear, sunny skies and a semi-arid climate. The general elevation of the EIS Region is about 5,000 feet, with a significant portion greater than 7,000 feet. The high elevation and generally clean dry air combine to give large daily temperature fluctuations. The average maximum temperatures vary from 67 to 88 degrees Fahrenheit, with average minimum temperatures between 35 and 65 degrees. Daytime summer temperatures above 100 degrees are coupled with near-freezing temperatures at night. The average number of frost-free days is 140, with a range of less than 100 to more than 160, depending on location.

The annual precipitation varies between 10 and 14 inches; however, due to evapotranspiration losses, an annual moisture deficit of 10 to 12 inches occurs. During the growing season, the average precipitation varies from 4 inches in the northwest portion of the EIS Region to over 6 inches in the southwest portion. The extremes for growing season precipitation are 4 and 15 inches. These variations occur both geographically and yearly, and they result from differences in elevation and topography.

These latter differences cause variations in the prevailing wind direction and speed. Winds in the Gallup vicinity are predominantly from the southwest, while the winds measured in Farmington come from the east-northeast and the west.

In general, the lack of moisture received during the growing season may make reclamation in the EIS Region more difficult than in other parts of the country.

AIR QUALITY

The Environmental Protection Agency (EPA) has divided the country into Air Quality Control Regions (AQCR). The EIS Region lies mostly within the Four Corners Air Quality Control Region 14. New Mexico has designated this AQCR as State Region Number 1. A small portion of the EIS Region, in the vicinity of the Chaco Wash and Lee Ranch tracts, is in AQCR 156 or State Region Number 8. All AQCRs are classified either as "attainment areas" (they meet the national ambient air quality standards) or as "non-attainment areas" (they exceed the standards). Both of the AQCRs overlapping the EIS Region (14 and 156) are classified as attainment areas for total suspended particulates (TSP).

The annual background level of TSP is considered to be 30 micrograms per cubic meter (ug/m^3). The annual primary federal standard is 75 ug/m^3 maximum, and the annual New Mexico state standard is 60 ug/m^3. The 24-hour New Mexico state standard is 150 ug/m^3. None of these standards are normally exceeded in the EIS Region, making the AQCRs attainment areas for TSP.

Particulate matter (TSP) is usually the only pollutant generated in large enough quantities by surface mines to have a significant impact on regional air quality. Other pollutants such as nitric oxide (NO) and sulfur dioxide (SO^2) are not considered problems resulting from coal mining.

All new emission sources in an attainment area must be examined to determine if they are subject to the PSD regulations. Coal mines are subject to the PSD permit process if they have a potential to emit more than 250 tons per year of any air pollutant. Surface coal mines seldom exceed this level of emissions. Fugitive emmissions (in this case TSP) are tracked in this EIS, even though the mines probably are not subject to obtaining a PSD permit.

Under the PSD regulations, the San Pedro Parks Wilderness Area (managed by the U.S. Forest Service), and the Mesa Verde National Park are designated as Class I areas for air quality. (Class I areas have stringent limits on increased concentrations of sulfur dioxide and TSP, and are also given protection from visibility degradation.) Because of the distance of these Class I areas from the EIS Region and the relatively short distance TSP will travel from mining operations (generally less than 20 kilometers), these areas are considered to be outside of the EIS Region.

Under natural conditions, the EIS Region is subject to periods of blowing dust. The amount of dust in the air is dependent on several factors, such as wind speed and moisture content of the soil. These periods of blowing dust reduce visibility for the duration of the dust storms, and at times the ambient TSP standards are exceeded due to these natural conditions. Very limited data exists on the visibility in the EIS Region, and most of it is based on measurements taken at the Chaco Culture National Historical Park. This data shows the visual range to average about 127 miles. Ninety percent of the time the visual range is 160 miles or less, and 10 percent of the time it is 85 miles or less. A more detailed discussion of the visibility, and how it was calculated is found in Appendix G-1.

However, other data shows that the visibility in the San Juan Basin is in the range of 70-80 miles. (Trijonnis). The 73 mile value obtained using the

Ursenbach method, agrees with this value and is used as the current conditions in this document (Apendix G). This method uses the particulate level as the basis for the calculation of visibility, where as the Park Service used a contrast rating system.

The EIS Region experiences air inversions nearly 70 percent of the time. However, these inversions usually are dispersed by daytime surface heating. The region generally experiences a deep air mixing level, which disperses pollutants.

TOPOGRAPHY AND GEOLOGIC HAZARDS

Topography

The San Juan River Region lies within the San Juan topographic and structural basin. The central part of the basin is a dissected plateau, the surface of which slopes gently west, and is characterized by low mesas, buttes and broad cuestas. The Bisti Badlands (barren, colorful shale hills and gulleys) are notable. The Continental Divide wanders through the EIS Region in a northeast to northerly direction and is generally expressed as a subdued ridge, little more prominent than many other ridges or nearby mesas. The principal streams have cut into the semi-arid plateau to form steep-walled canyons.

Geologic Hazards

Ground subsidence has occurred as a result of underground mining in the Ambrosia Lake Uranium District, an area 5 to 6 miles south of the Lee Ranch tracts (refer to Visual C enclosed with the Draft EIS, for the location of these tracts). Additional collapse over old mine workings is possible in this district. Subsidence from natural causes is known around "pipes" in the shale in badland areas of the Fruitland and Kirtland Formations. The uneven erosion of the alternating sandstone and shales of Cretaceous age presents opportunity for slope failures and rockfalls.

MINERAL RESOURCES

Coal Stratigraphy

"Coal deposits are present in the back-shore facies of every one of the transgressive and regressive marine sandstones of the San Juan basin from the Dakota Sandstone through the Gallup Sandstone Crevasse Canyon Formation, the Mesaverde Group, and the Fruitland Formation. Coal has been commercially mined from all of these units" (Fassett, 1976, p. 190). In this EIS Region, the Dakota Sandstone is not known to contain commercial coal; however, the other coal- bearing units do contain commercial coal. Most of the Upper Cretaceous coal formed in swamps that bordered the shore of an interior sea.

The Crevasse Canyon Formation contains two coal-bearing units: the Dilco Member and the Gibson Member (Figure 2-1). These units occur only in the southern part of the ES area, as shown on Figure 2-2. The Mesaverde Group also

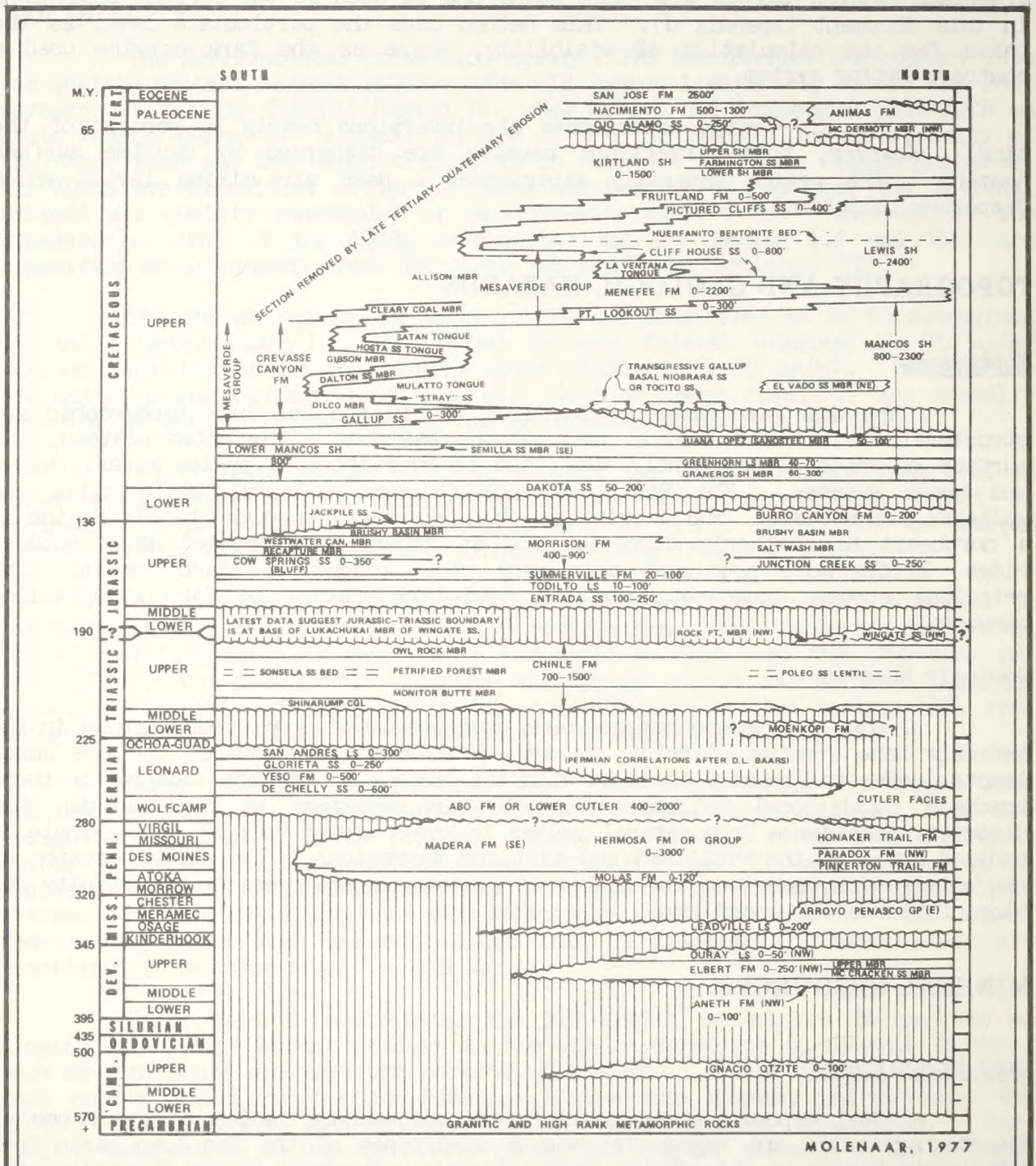


Figure 2-1

SAN JUAN BASIN TIME-STRATIGRAPHIC NOMENCLATURE CHART

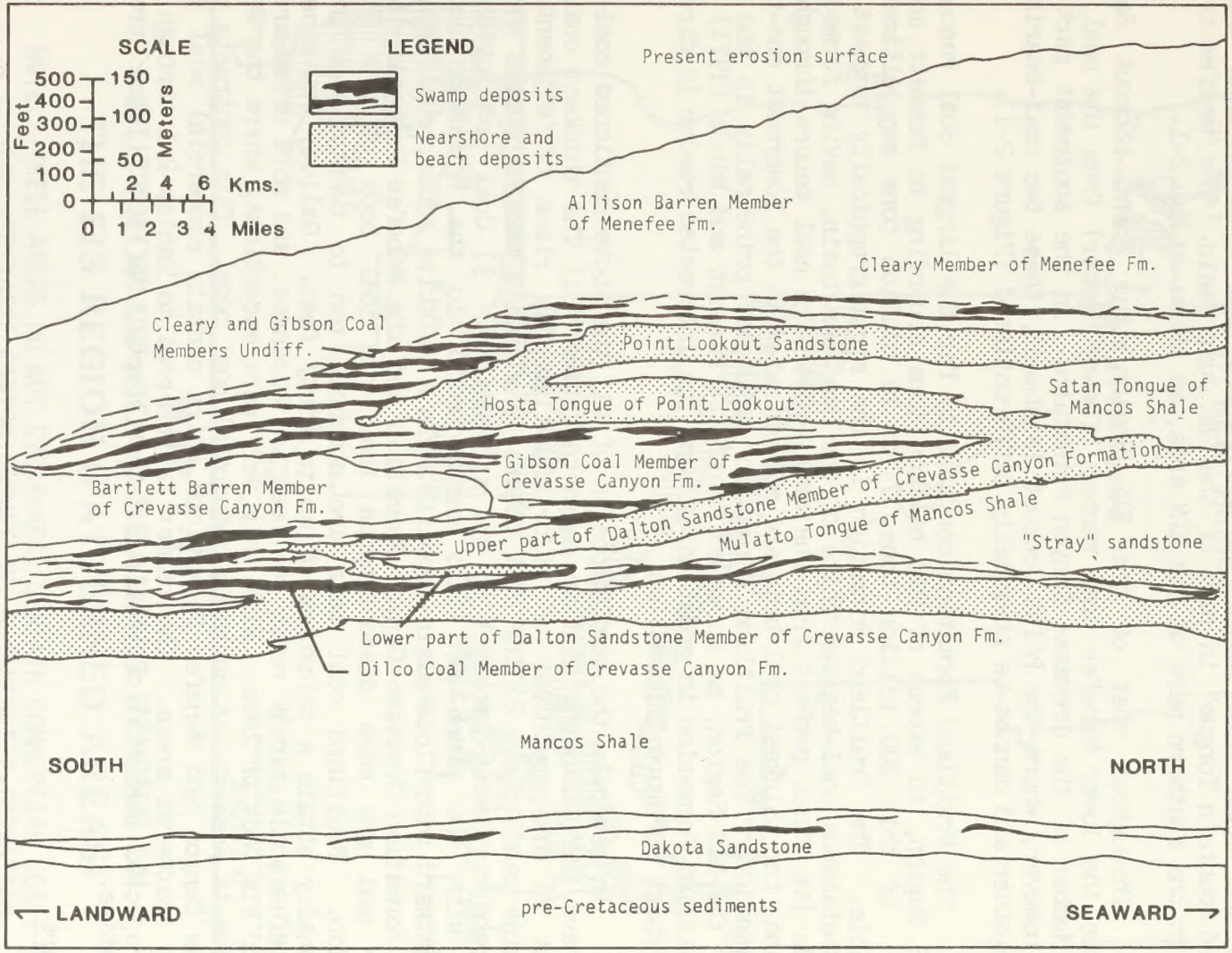


Figure 2-2. Generalized Cross Section of Coal Beds Near Gallup **Source: Beaumont, Shoemaker, and Kottlowski, 1971**

contains two coal bearing units (Figure 2-1 and Map 2-1); these units are located in the lower most and upper most hundred feet of the Menefee Formation and are in formally called the "lower coal member" and "upper coal member" throughout most of the basin. In the southwest part of the basin, the lower coal member of the Menefee Formation is formly named the Cleary Coal Member. Part of the upper coal member of the Menefee has been formally named the "Hogback Mountain Tongue" in part of the San Juan Basin. The Menefee crops out mainly in the southern part of the EIS area, as shown on Map 2-1.

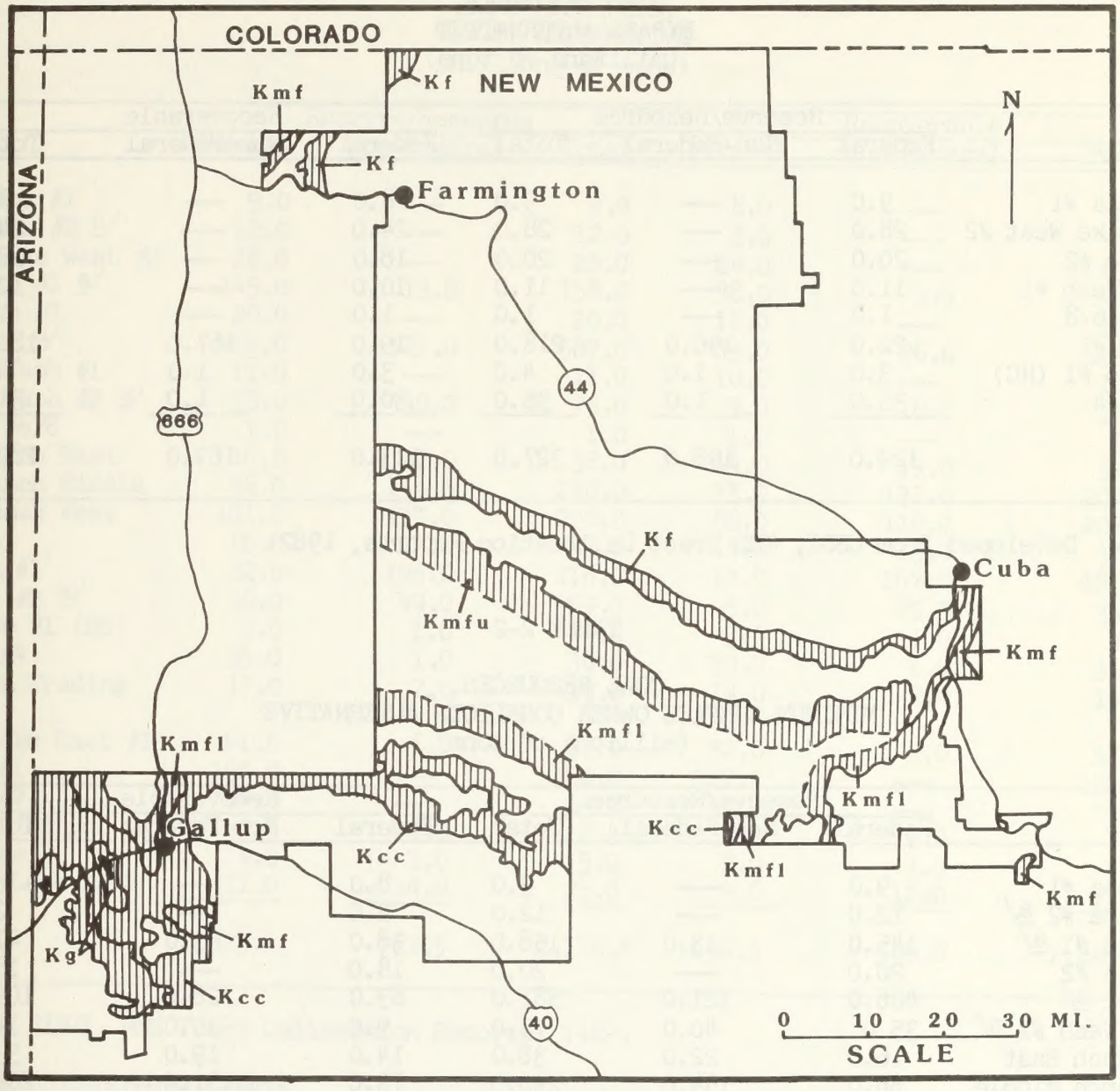
Throughout most of the EIS Region, the Point Lookout Sandstone separates the lower Menefee coal member (Cleary Member) from the coal bearing Gibson Member of the Crevasse Canyon Formation. In the southwest part of the basin, however, where the Point Lookout is absent, these two coal-bearing units come together and cannot be physically differentiated (Figure 2-1).

The Fruitland Formation contains by far the largest coal resources of the EIS Region, in excess of 200 billion tons according to Fassett and Hinds (1971). Of this 200 billion tons, 7 to 10 billion tons may ultimately be strippable. The Fruitland Formation is the stratigraphically highest of the Upper Cretaceous coal-bearing units of the San Juan basin, having formed as the sea made its final retreat from the area. Although coal occurs throughout the Fruitland, the thickest coal beds are concentrated in the lowermost one-third of the formation. The Fruitland Formation crops out principally in the central part of the EIS Region, as shown on Map 2-1. Fassett and Hinds (1971) discuss the Fruitland Formation in great detail and the interested reader is directed to their report for more information.

In general, the coal deposits of all the above mentioned coal-bearing units have the following similar characteristics: 1) The thickest coal occurs adjacent to and southwest of major stratigraphic rises of adjacent marine strandline sandstone. 2) The coal occurs in elongate tabular bodies whose long axes trend northwest parallel to the strandlines. 3) Coal beds often intertongue with the pinch out into marine rocks to the northeast and grade southwestward into flood-plain deposits. In a relative sense, coal beds of the Gallup Formation Crevasse Canyon Formation and the Menefee Formation are much thinner and are more discontinuous than are coal beds of the Fruitland Formation. Fruitland coal beds are commonly ten to twenty feet thick and occasionally attain a thickness of up to forty feet. Gallup, Crevasse Canyon and Menefee coals rarely reach ten feet in thickness, and more often are on the order of six feet or less. With only very rare exceptions, where the Fruitland Formation is present, it contains commercial coal beds. This contrasts with the Crevasse Canyon and Menefee Formations which contain commercial coal deposits only in scattered areas. The reader is referred to Tables 2-1 through 2-4 for the projected amounts of coal in the competitive coal lease tracts by alternative.

Structure

The San Juan Basin is a structural depression bounded on four sides by uplifted parts of the earth's crust: on the north, the San Juan Uplift; on the east, the Nacimiento Uplift; on the south, the Zuni Uplift; on the west, the Defiance Uplift, as shown on Map 2-2. The basin is asymmetrical, being deepest in the northeast part. The structure of the basin is shown on the map by contour lines drawn on the base of the Dakota Sandstone.



MAP 2-1
OUTCROP OF COAL-BEARING ROCKS IN THE EIS REGION (PATTERNED AREAS)

NOTE: THESE AREAS DO NOT EVERYWHERE CONTAIN COMMERCIAL COAL. (Kcc-CREVASSE CANYON FORMATION, Kmf-MENEFEE FORMATION, Kmfl-LOWER COAL-BEARING MEMBER OF MENEFEE FORMATION, Kmfu-UPPER COAL-BEARING MEMBER OF MENEFEE FORMATION, Kf-FRUITLAND FORMATION, Kg-GALLUP FORMATION.)

Source: USDI, 1979 Bisti - Star Lake Regional Coal EIS

TABLE 2-1

COAL RESOURCES,
BYPASS ALTERNATIVE
(millions of tons)

Tract	Reserve/Resource			Recoverable		
	Federal	Non-Federal	Total	Federal	Non-Federal	Total
La Plata #1	9.0	---	9.0	8.0	---	8.0
Star Lake West #2	28.0	---	28.0	24.0	---	24.0
Kimbeto #2	20.0	---	20.0	18.0	---	18.0
Gallo Wash #1	11.0	---	11.0	10.0	---	10.0
Bisti #6/8	1.0	---	1.0	1.0	---	1.0
Hospah #1	22.0	196.0	218.0	19.0	167.0	186.0
Gamerco #1 (HC)	3.0	1.0	4.0	3.0	1.0	4.0
Bisti #4	35.0	1.0	36.0	30.0	1.0	31.0
TOTALS	129.0	198.0	327.0	113.0	169.0	282.0

Source: Developed from USDI, MMS Tract Delineation Reports, 1982.

TABLE 2-2

COAL RESOURCES,
MINIMUM SURFACE OWNER CONFLICTS ALTERNATIVE
(millions of tons)

Tract	Reserve/Resource			Recoverable		
	Federal	Non-Federal	Total	Federal	Non-Federal	Total
La Plata #1	9.0	---	9.0	8.0	---	8.0
La Plata #2 [a/]	12.0	---	12.0	2.0	---	2.0
Kimbeto #1 [a/]	145.0	13.0	158.0	38.0	3.0	41.0
Kimbeto #2	20.0	---	20.0	18.0	---	18.0
Nageezi [a/]	466.0	121.0	587.0	83.0	26.0	109.0
Gallo Wash #2 [a/]	35.0	40.0	75.0	9.0	10.0	19.0
Lee Ranch East	16.0	22.0	38.0	14.0	19.0	33.0
Lee Ranch Middle	86.0	154.0	240.0	73.0	131.0	204.0
Lee Ranch West	101.0	137.0	238.0	86.0	116.0	202.0
Divide	16.0	27.0	43.0	14.0	23.0	37.0
Hospah #2 [a/]	10.0	49.0	59.0	5.0	25.0	30.0
TOTALS	916.0	563.0	1,479.0	350.0	353.0	703.0

Source: Developed from USDI, MMS Tract Delineation Reports, 1982.

Note: [a/] Underground tract

TABLE 2-3

COAL RESOURCES,
TARGET ALTERNATIVE
(millions of tons)

Tract	Reserve/Resource			Recoverable		
	Federal	Non-Federal	Total	Federal	Non-Federal	Total
La Plata #1	9.0	—	9.0	8.0	—	8.0
La Plata #2 [a]	12.0	—	12.0	2.0	—	2.0
Star Lake West #2	28.0	—	28.0	24.0	—	24.0
Kimbeto #1 [a]	145.0	13.0	158.0	38.0	3.0	41.0
Kimbeto #2	20.0	—	20.0	18.0	—	18.0
Nageezi [a]	466.0	121.0	587.0	83.0	26.0	109.0
Gallo Wash #1	11.0	—	11.0	10.0	—	10.0
Gallo Wash #2 [a]	35.0	40.0	75.0	9.0	10.0	19.0
Bisti #6/8	1.0	—	1.0	1.0	—	1.0
Lee Ranch East	16.0	22.0	38.0	14.0	19.0	33.0
Lee Ranch Middle	86.0	154.0	240.0	73.0	131.0	204.0
Lee Ranch West	101.0	137.0	238.0	86.0	116.0	202.0
Divide	16.0	27.0	43.0	14.0	23.0	37.0
Hospah #1	22.0	196.0	218.0	19.0	167.0	186.0
Hospah #2 [a]	10.0	49.0	59.0	5.0	25.0	30.0
Gamerco #1 (HC)	3.0	1.0	4.0	3.0	1.0	4.0
Bisti #4	35.0	1.0	36.0	30.0	1.0	31.0
Johnson Trading Post	17.0	2.0	19.0	14.0	2.0	16.0
Star Lake East #1	61.0	6.0	67.0	52.0	5.0	57.0
Bisti #1	150.0	—	150.0	127.0	—	127.0
Bisti #2	64.0	—	64.0	54.0	—	54.0
Catalpa Canyon	0.4	8.0	8.4	.3	7.0	7.3
Sundance	4.0	1.0	5.0	3.0	1.0	4.0
Samson Lake #2/2	11.0	14.0	25.0	9.0	12.0	21.0
TOTALS	1,323.4	792.5	2,115.4	696.3	549.0	1,245.3

Source: USDI, MMS Tract Delineation Reports, 1982.

Note: [a] Underground tracts

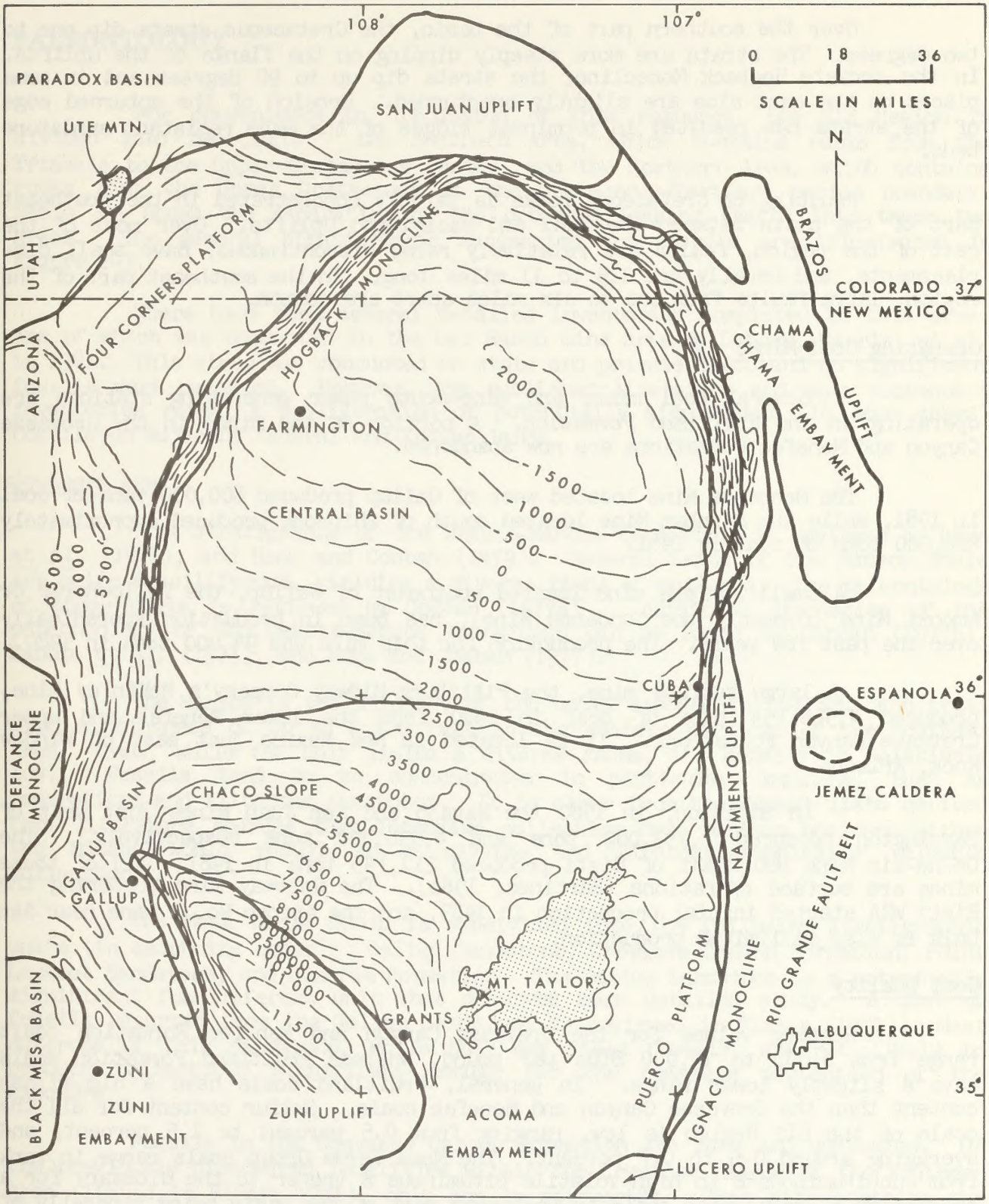
TABLE 2-4

COAL RESOURCES
HIGH ALTERNATIVE
(millions of tons)

Tract	Reserve/Resource			Recoverable		
	Federal	Non-Federal	Total	Federal	Non-Federal	Total
La Plata #1	9.0	—	9.0	8.0	—	8.0
La Plata #2 [a]	12.0	—	12.0	2.0	—	2.0
Star Lake West #2	28.0	—	28.0	24.0	—	24.0
Kimbeto #1 [a]	145.0	13.0	158.0	38.0	3.0	41.0
Kimbeto #2	20.0	—	20.0	18.0	—	18.0
Nageezi [a]	466.0	121.0	587.0	83.0	26.0	109.0
Gallo Wash #1	11.0	—	11.0	10.0	—	10.0
Gallo Wash #2 [a]	35.0	40.0	75.0	9.0	10.0	19.0
Bisti #6/8	1.0	—	1.0	1.0	—	1.0
Lee Ranch East	16.0	22.0	38.0	14.0	19.0	33.0
Lee Ranch Middle	86.0	154.0	240.0	73.0	131.0	204.0
Lee Ranch West	101.0	137.0	238.0	86.0	116.0	202.0
Divide	16.0	27.0	43.0	14.0	23.0	37.0
Hospah #1	22.0	196.0	218.0	19.0	167.0	186.0
Hospah #2 [a]	10.0	49.0	59.0	5.0	25.0	30.0
Gamerco #1 (HC)	3.0	1.0	4.0	3.0	1.0	4.0
Bisti #4	36.0	1.0	37.0	30.0	1.0	31.0
Johnson Trading Post	17.0	2.0	19.0	14.0	2.0	16.0
Star Lake East #1	61.0	6.0	67.0	52.0	5.0	57.0
Bisti #1	150.0	—	150.0	127.0	—	127.0
Bisti #2	64.0	—	64.0	54.0	—	54.0
Catalpa Canyon	0.4	8.4	8.8	.3	7.1	7.4
Sundance	4.0	1.0	5.0	3.0	1.0	4.0
Samson Lake #2/2	11.0	14.0	25.0	9.0	12.0	21.0
La Plata #3	2.0	3.0	5.0	2.0	2.0	4.0
La Plata #4 [a]	20.0	—	20.0	10.0	—	10.0
Star Lake East LC [a]	64.0	—	64.0	21.0	—	21.0
Crownpoint NE	150.0	—	150.0	94.0	—	94.0
Crownpoint East (HC/LC)	149.0	6.0	155.0	124.0	5.0	129.0
Chico Wash South	74.0	6.0	80.0	63.0	8.0	71.0
Tah-ha-bah Well [a]	23.0	—	23.0	12.0	—	12.0
Hogback	5.0	—	5.0	4.0	—	4.0
Twin Buttes	68.0	—	68.0	30.0	—	30.0
Pinehaven	7.0	—	7.0	6.0	—	6.0
Bread Springs #1	1.0	1.0	2.0	1.0	1.0	2.0
Bread Springs #2 [a]	10.0	2.0	12.0	5.0	2.0	7.0
Gamerco #1 (LC)	2.3	1.3	3.6	1.9	1.2	3.1
Gamerco #2 LC) [a]	17.0	19.0	36.0	8.0	9.0	17.0
Samson Lake #1 [a]	26.0	0.0	26.0	13.0	—	13.0
TOTALS	1,942.7	830.7	2,773.4	1,093.2	577.3	1,668.5

Source: USDI, MMS Tract Delineation Reports, 1982.

Note: [a] Underground tracts



MAP 2-2 STRUCTURE MAP OF THE SAN JUAN BASIN, SHOWING CONTOURS ON THE BASE OF THE DAKOTA SANDSTONE. INTERVAL, 500 FEET. NUMBERS REPRESENT EXISTING OR PROJECTED ELEVATION ABOVE OR BELOW SEA LEVEL.

Source: Silver, 1950, and Fassett & Hinds, 1971.

Over the southern part of the basin, the Cretaceous strata dip one to two degrees. The strata are more steeply dipping on the flanks of the uplifts. In the arcuate Hogback Monocline, the strata dip up to 90 degrees and in some places on the east side are slightly overturned. Erosion of the upturned edge of the strata has resulted in prominent ridges of the more resistant sandstone beds.

Faulting of Cretaceous rocks is largely concentrated in the southeast part of the basin between the Zuni and Nacimiento Uplifts. Over most of the rest of the region, faults are relatively rare, discontinuous, have small displacements, and usually are 1.5 to 11 miles long. In the southeast part of the region, large faults from one to six miles apart are common.

Operating Coal Mines

Several coal mines and mine-mouth power generating stations are operating in the Fruitland Formation. A portion of the mines in the Crevasse Canyon and Menefee Formations are now abandoned.

The Mentmore Mine located west of Gallup produced 800,000 tons of coal in 1981, while the Burnham Mine located south of Shiprock produced approximately 800,000 tons of coal in 1981.

A small surface mine located southeast of Gallup, the Yellowhorse or Amcoal Mine (formerly the Sundance Mine), has been in production sporadically over the past few years. The production for this mine was 94,000 tons in 1980.

A large surface mine, the Pittsburg-Midway Company's McKinley Mine, produced 4,568,154 tons of coal in 1980 from the lower Menefee and upper Crevasse Canyon Formations. It is located in New Mexico just east of Window Rock, Arizona.

In addition, in 1980 the Navajo and San Juan Mines just west of Farmington produced 7,733,000 tons and 4,538,000 tons respectively. The De-na-zin Mine southeast of Bisti produced 211,145 tons in 1981. All of these mines are surface operations (Martinez, 1981). The Gateway Mine bordering the Bisti WSA started initial production in 1983, and the Arroyo No. 1 mine near San Luis is also in limited production.

Coal Quality

Heating values for the Crevasse Canyon and Menefee Formation coals range from 8,000 to 12,000 BTUs per pound, whereas Fruitland Formation coals have a slightly lower range. In general, Fruitland coals have a higher ash content than the Crevasse Canyon and Menefee coals. Sulfur content for all the coals of the EIS Region is low, ranging from 0.5 percent to 1.5 percent, and averaging around 0.6 to 0.7 percent. The Mesa Verde Group coals range in rank from subbituminous B to high-volatile bituminous B (refer to the Glossary for a discussion of rank) with coals in the upper part of the basin being generally of higher rank. The Fruitland Formation coals range from subbituminous A to high-volatile bituminous C, with the northern Fruitland coals generally somewhat higher in rank.

PALEONTOLOGY

For convenience in discussion of this resource, the EIS Region is divided into two parts: the Southern Area, which contains rocks from the Triassic to the Upper Cretaceous period, and the Northern Area, which contains rocks from the Upper Cretaceous to the Cretaceous-Tertiary period boundary. Table 2-5 shows the separation of the proposed leasing tracts into these two areas. The general stratigraphic succession and fossils are illustrated in Figure 2-3.

There have been several detailed inventories completed in this area, one of which was conducted in the Lee Ranch mine area by LeMone, Harris, et al. in 1981. This study was conducted on state and private lands and no significant fossils were reported. However, the published literature and some subsequent inventories reveal a proliferation of potentially significant (in some cases) fossils on adjacent federal and Indian lands.

Southern Area

The stratigraphy of the Dakota-Mancos transition is reviewed by Dane et al. (1971), and Hook and Cobban (1979). Several units of the Mancos Shale are quite fossiliferous, yielding a diverse fauna of molluscs. The paleontology of these units is reviewed by Cobban (1977a) dditional discussion of the paleontology of the Dakota-Mancos transition can be found in Cobban (1977b), Landis et al. (1973), and Hook and Cobban (1977).

The Mancos is the thickest of the units exposed in the Southern Area, with a thickness of up to 2,300 feet in the eastern portions of the Southern Area. Thus, while the unit yields a diverse fauna, its density is relatively low. Fossils tend to be concentrated in particular horizons, such as concretions and siltstone interbeds. It is clear from the faunal lists derived from literature sources that intensive collecting from various horizons within the Mancos would result in a diverse and biostratigraphically valuable collection.

The Mesa Verde Group is subdivided into the following stratigraphic units (in ascending order): Gallup Sandstone, Crevasse Canyon Formation, Point Lookout Sandstone, and Menefee Formation. The Gallup Sandstone is a potentially significant fossiliferous unit that deserves more detailed study. A list of fossils reported from the Gallup Sandstone is reviewed in Flessa (1981). Most outcrops of this sandstone, while they may yield fossils, are not likely to produce collections significant enough for the complete protection of the exposure.

Fossils in the Crevasse Canyon Formation are rare and unstudied. Of the previously discovered localities within the Crevasse Canyon of the Southern Area (listed in Flessa 1981), only one is noteworthy. This site contains the first vertebrate material to be precisely noted from the Crevasse Canyon. The presence of coal units within the Crevasse Canyon and the known presence of plant fossils suggests that a concentrated paleobotanical survey would be likely to yield important plant fossils.

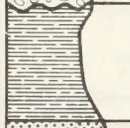
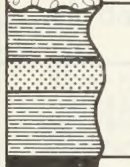
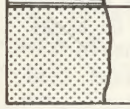
TABLE 2-5

SEPARATION OF PROPOSED COAL LEASING TRACTS INTO AREAS FOR PALEONTOLOGY ANALYSIS

Northern Area	
La Plata #1	Bisti #4
La Plata #2	Johnson Trading Post
Star Lake East #2	Star Lake East #1
Kimbeto #1	Bisti #1
Kimbeto #2	Bisti #2
Nageezi	La Plata #3
Gallo Wash #1	La Plata #4
Gallo Wash #2	Star Lake East (LC)
Bisti #6/8	

Southern Area	
Lee Ranch East	Crownpoint East (HC/LC)
Lee Ranch Middle	Chico Wash South
Lee Ranch West	Tah-ha-bah Well
Divide	Hogback
Hospah #1	Twin Buttes
Hospah #2	Pinehaven
Gamerco #1 (HC)	Bread Springs #1 and #2
Catalpa Canyon	Gamerco #1 (LC)
Sundance	Gamerco #2
Samson Lake #2/2	Samson Lake #1
Crownpoint Northeast	

Figure 2-3. General Stratigraphic Section

Lithology	Rock-Strat. Units	Age	Fossils
	Alluvium	Quaternary	None reported
	San Jose Formation	Early Eocene	Diverse vertebrate faunas of primitive mammals, turtles, crocodiles, fish, lizards, snakes, and a bird. Some fresh water gastropods and unionids. Rare fossil leaves and some petrified wood.
	Nacimiento Formation	Early to Middle Paleocene	Diverse vertebrate faunas of mammals, etc. Some fresh water invertebrates, wood and leaves.
	Ojo Alamo Sandstone	Earliest Paleocene	Rare fossil mammals. Much petrified wood.
	Kirtland Shale	Late Cretaceous	Dinosaurs, turtles, crocodiles, and other vertebrates. Leaves and wood locally abundant. Some fresh water invertebrates.
	Fruitland Formation	Late Cretaceous	Similar to Kirtland some brackish water inverts much fossil wood.
	Pictured Cliffs Sandstone	Late Cretaceous	Marine invertebrates and trace fossils.
	Lewis Shale	Late Cretaceous	Bivalves, ammonites, and other marine invertebrates, one mosasaur.
	Cliff House Sandstone	Late Cretaceous	Marine invertebrates and trace fossils, sharks teeth.

(continued on next page)

(Figure 2-3 continued)

Lithology	Rock-Strat. Units	Age	Fossils
	Menefee Formation	Late Cretaceous	Fossil leaves and wood common. Rare vertebrates (mostly shark teeth and turtle scrap) and invertebrates.
	Point Lookout Sandstone	Late Cretaceous	Marine invertebrate and trace fossils.
	Crevasse Canyon Formation	Cretaceous	Some fossil leaves and wood. Rare lower vertebrate and invertebrate fossils.
	Gallup Sandstone	Cretaceous	Marine inverts some fossil leaves
	Mancos Shale	Cretaceous	Great Diversity of marine invertebrates, especially ammonites and bivalves.
	Dakota Sandstone	Lwr (?) Cret.	Marine inverts, plants
	Morrison Formation	Late Jurassic	Some dinosaurs and petrified wood
	San Rafael Group	Jurassic	Brackish water invertebrates. Fish in Todilto Limestone, and rare fossil plants.
	Chinle Formation	Late Triassic	Plant and lower vertebrate fossils locally abundant.

Generalized composite section showing formations that crop out in the EIS Region. Fossils listed are those reported from the literature sources pertaining to areas both within and adjacent to the EIS Region. There are regional variations in thickness and facies.

KEY

SANDSTONE
CONGLOMERATE
SHALE
COAL
LIMESTONE
ALLUVIUM & BASALT
UNCONFORMITY

Scale: I = 300 feet

Little detailed stratigraphic and no detailed paleontological work on the Menefee Formation have been done within the Southern Area. In areas previously studied, plant fragments are the most commonly reported fossil material. An evaluation of the potential paleontological significance of the Menefee is extremely difficult because so little is known about it. A previous survey (Kues et al., 1977) suggests that the Menefee may yield significant paleobotanical material upon close inspection.

Northern Area

Late Cretaceous formations in this area fall into three general environments: off-shore marine deposits (mainly shale, minor sandstones and limestones); regressive and transgressive shoreline deposits (usually sandstones); and continental sediments (generally shales and sandstones representing stream or swamp environments and containing more organic material, notably coal). By far the largest part of the Northern Area contains exposures of the Late Cretaceous Kirtland/Fruitland Formation. Older off-shore marine and shoreline deposits all contain marine invertebrate faunas of varying diversity, mostly molluscan. Other discussion can be found in the BLM's Chaco-San Juan Planning Unit Resource Analysis -- Update for Coal (USDI, BLM 1980b). A review of the flora and fauna of the Late Cretaceous is given in Kues et al. (1977), and Lucas, Rigby and Kues, eds. (1981).

The Kirtland/Fruitland Formation has received special attention because of its vertebrate faunas. This formation and the Nacimiento contain an almost unparalled record of one of the most important episodes in the history of life — the abrupt change from domination of terrestrial communities by dinosaurs to domination by mammals.

The new Museum of Natural History would be an excellent facility to curate the fossils of the San Juan Basin. They would also help in excavation of and in studying the fossils that were found.

SOILS

Soils for the 39 tracts are represented by 3 groups and 13 associations, with small occurrences of other soils (refer to Table 2-6). These soils are derived from alluvial, eolian, and residuum sandstone and shale. They are found on uplands, mesas, benches, hillsides, fans, valley sideslopes, and valley bottoms. Soil textures are represented by sands, loams, and clays. Soil depths run from shallow (±15 inches) to deep (+40 inches), and soil colors range from browns to grays. Permeability is slow to rapid, with runoff high to low. Some of the soil associations have inclusions of soils with gravelly substrata, alkali-affected areas, rocklands, and badlands. A general discription of the 13 soil association is as follows:

Soil Associations 1, 4, 6, and 8 through 13 on Table 2-6 have inclusions of badland area soils. These badland soils are shallow and poorly developed, and are considered to be unsuitable as a source of planting media by themselves. Sparse vegetation and barren areas are found on these soils, with natural fertility and organic matter very low. Soil textures are generally clays; restricted permeability, high salinity, severe erosion hazards, and excessive slopes are characteristic. Rough topography and deep drainage channels can be found in these areas.

TABLE 2-6

SOILS INTERPRETATION SUMMARY

	Soil Association	Depth (Inches)	Runoff Rate	Erosion/Hazard	Color	Permeability	Texture/Surface	Origin	Percent of Association
1.	Hagerman-Travessilla	12-40	Medium	Moderate-High	Browns	Moderate-Rapid	Fine sandy loam-silty clay loam	Residually weathered sandstone and shale	Hagerman (35%)-Travessilla (20%)
2.	Las Lucas-Litle-Persayo	10-60	Medium-Rapid	Moderate-High	Gray	Slow-Moderate	Loam-silty clay cloam	Shale bedrock or alluvium	Las Lucas (30%)-Litle (25%)-Persayo (25%)
3.	Shiprock-Sheppard Doak	40-60	Slow-Medium	Moderate-High	Browns	Moderate-Rapid	Fine sandy loam-loam	Alluvial & eolian sandstone & shale	Shiprock (28%)-Sheppard (23%)-Doak (23%)
4.	Blancot-Notal	60	Medium	Moderate-High	Browns	Slow-Moderate	Loam-silty clay loam	Sandstone & shale alluvium	Blancot (55%)-Notal (25%)
5.	Sheppard-Huerfano-Notal	15-60	Medium	Moderate	Browns	Moderate-Rapid	Loamy fine sand-silty clay loam	Eolian, alluvial, residuum sand stone, shale, & siltstone	Sheppard (25%)-Huerfano (13%)
6.	Badland-Rock Outcrop Monierco	±13	Medium-Rapid	Moderate-High	Brown-Grays	Slow-Rapid	Fine sandy loam-barren shale & sandstone	Eolian & alluvial material	Badlands (74%)-Rock Outcrop (15%)- Monierco (8%)
7.	Persayo-Lohmiller	10-60	Medium-Rapid	Moderate-High	Grays-Browns	Slow-Moderate	Fine sand-clay	Residual sandstone & shale, eolian sands & alluvial & sandstone	Persayo (35%-Lohmiller (30%)
8.	Penistaja-Sheppard Rockland	±60	Slow-Medium	Moderate-High	Browns	Moderate-Rapid	Loamy fine sand-clay loam	Eolian & alluvial shale stone & shale	Penistaja (35%)-Sheppard (20%)-Rockland (25%)
9.	Penistaja-Sheppard	±60	Slow-Medium	Moderate-High	Browns	Moderate-Rapid	Loamy sand-light clay loam	Eolian & alluvial sand-sandstone & shale	Penistaja (55%)-Sheppard (25%)
10.	Travessila-Persayo-Rockland	10-20	Medium-Rapid	Moderate-High	Browns-Grays	Slow-Moderate	Fine sandy loam-silty clay loam	Residually weathered sand & shale	Travessilla (30%)-Persayo (25%)-Rockland (25%)
11.	Penistaja-Sheppard-Palma	±60	Slow-Medium	Moderate-High	Browns	Moderate-Rapid	Loamy sand-light clay loam	Eolian & alluvial deposits & residuum sandstone & shale	Penistaja (35%)-Sheppard (20%)-Palma (20%)
12.	Thurloni-Savoia-Concho	20-60	Medium	Moderate	Browns-Grays	Moderate	Fine sand-clay	Eolian sands, alluvial	Thurloni (30%)-Savoia (20%)-Concho (12%)
13.	Penistaja-Lohmiller Travessila	10-60	Medium	Moderate	Browns	Moderate-Rapid	Fine sand-clay	Eolian sands, alluvial & residuum sandstone & shale	Penistaja (35%)-Lohmiller (30%)- Travessilla (25%)

Inclusions of rockland area soils are found within Soil Associations 1, 2, 4 and 6 through 13 (Table 2-6). These rockland soils are highly variable, having textures ranging from sands to sandy loams. They are generally shallow and poorly developed. Considered unsuitable as planting media, these soils have very low natural fertility and organic matter, and erosion occasions from wind and water is high. The percentage of occurrence of rockland areas within the proposed lease tracts runs from 3 to 27 percent.

Some soils found in valley areas are considered unsuitable for planting media by themselves; organic matter and natural fertility is very low. (Refer to Soil Associations 6 through 9 and 11 through 13 in Table 2-6.) These are saline-sodic soils with scattered sparse vegetation and barren areas. Found on nearly level or very gently sloping areas, these soils have developed from streamflow deposits, except for very shallow sandy windblown material in scattered areas. Textures usually range from loamy sand to clay. Permeability varies, but where a high amount of sodium occurs, moisture penetration is very restricted or eliminated. Sodium levels are sometimes high in both surface and sub-soils, ranging from 15 to 50 percent of the exchange capacity (refer to the Glossary).

Soils found within active dunes are considered unsuitable for planting media. These areas consist of undulating ridges and small hills. Soils are generally barren and subject to severe wind erosion, with a very low natural fertility level and an organic matter content of nearly zero. Textures are usually fine sand and sand. These soils have excessive permeability resulting in low water-holding capacity and little water availability for plant growth.

Soils found in stream and drainage channels are considered unsuitable for planting media by themselves. These soils are composed of deposits associated with major drainage systems. Natural fertility level is very low, and water-holding capacity is very poor. Textures are usually sandy with deposits of gravel and cobble. These soils are subject to severe wind erosion and are usually barren.

Coarse-textured soils (sands) have reclamation limitations. Natural fertility level is very low and organic matter content is nearly zero. Soils depths range from 13 to 60 inches, with texture from sand to loamy sand. These soils have high permeability rates, resulting in low water-holding capacity. Plant growth is mainly dependent on precipitation because available water within the plant's root zone is limited. The lack of plant growth results in active wind erosion.

Fine-textured soils (silts & clays) also have reclamation limitations. Natural fertility and organic matter is very low. Soil depths range from 10 to more than 40 inches, and textures range from silty clay loam to clays. These soils have high runoff rates resulting in low water intake. Water found in fine-textured soils is often near the surface and lost to plant growth because of evaporation. Wind erosion is high for these soils.

Soil data regarding reclamation was taken from the sources cited above, and the BLM's Energy Mineral Rehabilitation Inventory and Analysis (EMRIA) reports dating from 1976 through 1981.

Soil data for the 39 tracts was taken from the Soil Survey of San Juan County, New Mexico, Eastern Part (USDA, SCS BIA, BR and NM Agricultural

Experiment Station 1980) and the Chaco-San Juan Planning Unit Resource Analysis--Update for Coal (USDI, BLM 1980b).

WATER RESOURCES

Surface Water

Data about surface water on the individual coal tracts do not exist; however, site-specific information is required as part of the mining and reclamation plan that the applicant submits to the Office of Surface Mining and the New Mexico Coal Surface Mining Commission. The following section is a general description of surface water in the EIS Region.

The EIS Region lies within both the Rio Grande and Colorado River drainage basins. The coal tracts east of the Continental Divide (Rio Grande basin) drain to Arroyo Chico. Most of the tracts lie west of the Divide in the Colorado River basin. The La Plata tracts and those in the Chaco River basin drain to the San Juan River. The tracts near Gallup are in the Puerco River watershed, except for the small part of the Pinehaven tract that is in the Zuni River drainage. The location of the coal tracts in relation to the major drainage basins is shown in Figure 2-4.

Surface Water Quantity

The limited quantity and erratic temporal and spacial distribution of precipitation causes streamflow to be extremely variable. Approximately one half of the annual precipitation occurs from July through October, generally in the form of localized, short-duration, high-intensity thunderstorms. These storms may create large flows, which are commonly of limited duration and areal extent. Winter precipitation produces longer, lower volume flows. Precipitation is summarized in Appendix Figure B-1.

The San Juan and the Animas Rivers are the only perennial streams in the area; both derive much of their flow from snowmelt in the San Juan Mountains in Colorado. The reaches of Arroyo Chico and the Puerco River have flow caused by uraniuim-mine dewatering and the Chaco River near Waterflow generally has flow because of powerplant wastewater effluent. All other streams in the area are either ephemeral (that is, flowing only in direct response to precipitation) or intermittent (flowing only at certain times of the year).

Daily streamflow for the 1981 water year for gaging stations on the Chaco River near Burnham and on Arroyo Chico near Guadalupe is shown in Figure 2-5. The variability in day-to-day flow and the sharp increases in flow caused by precipitation are typical of streams in the EIS Region.

Graphs of average monthly streamflow (Figure 2-6) are also indicative of the variability of streamflow. The La Plata River graph clearly demonstrates the increase in flow in spring and early summer caused by snowmelt in the headwaters of the stream in Colorado. In contrast, the greatest average monthly flows in Arroyo Chico are caused by rainfall from July through October. The graphs of streams in the Chaco River basin are based on a much shorter period of measurement and may reflect greater than normal winter precipitation in recent years. Graphs based on additional future measurements are expected to more closely approximate the Arroyo Chico graph.

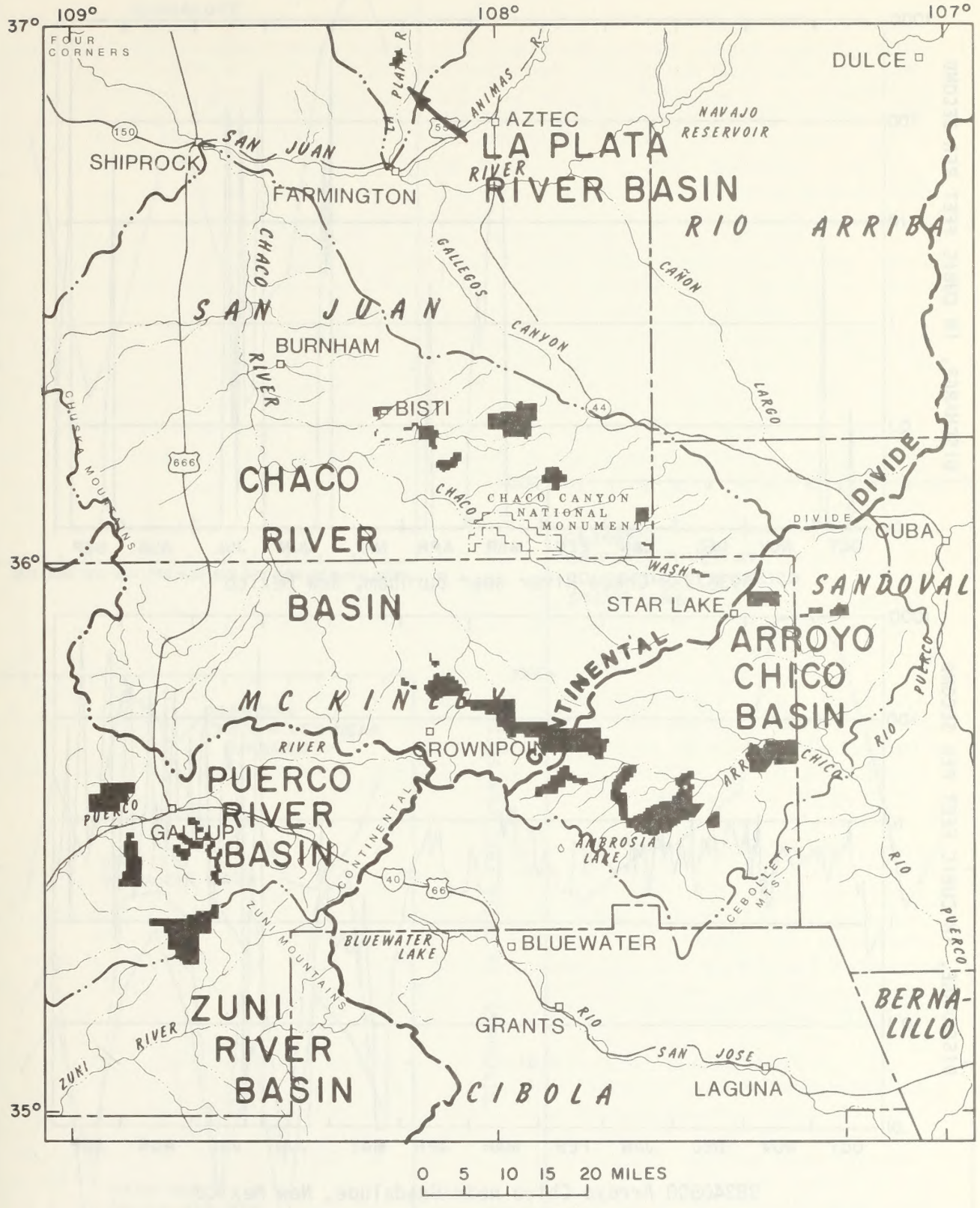
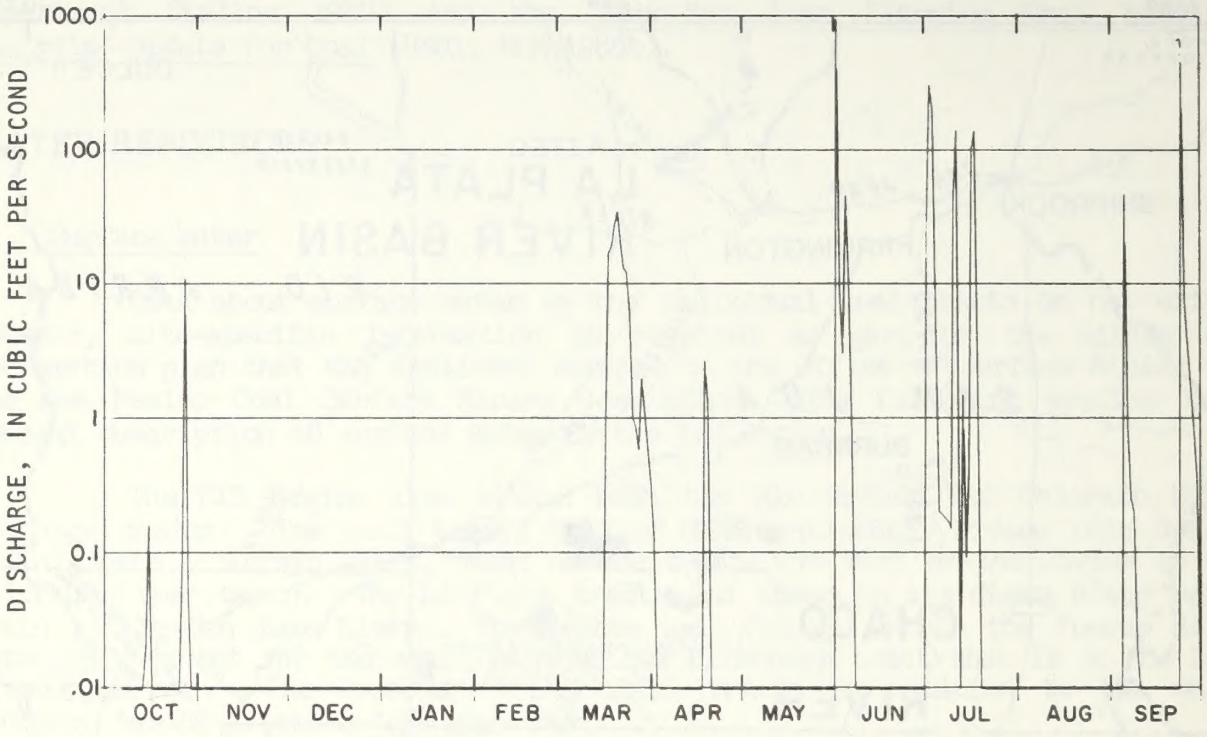
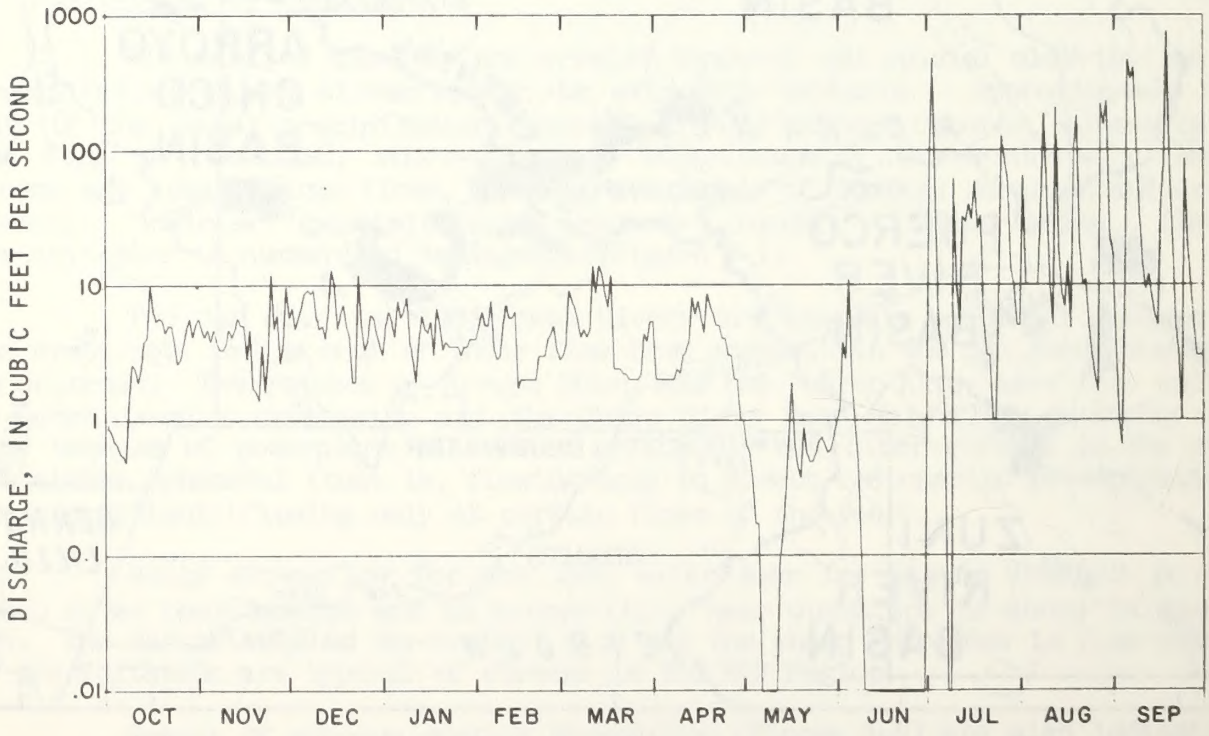


Figure 2-4 Location of coal tracts in relation to major drainage basins.



09367938 Chaco River near Burnham, New Mexico



98340500 Arroyo Chico near Guadalupe, New Mexico

Figure 2-5 Daily streamflow at selected gaging stations, 1981 water year.

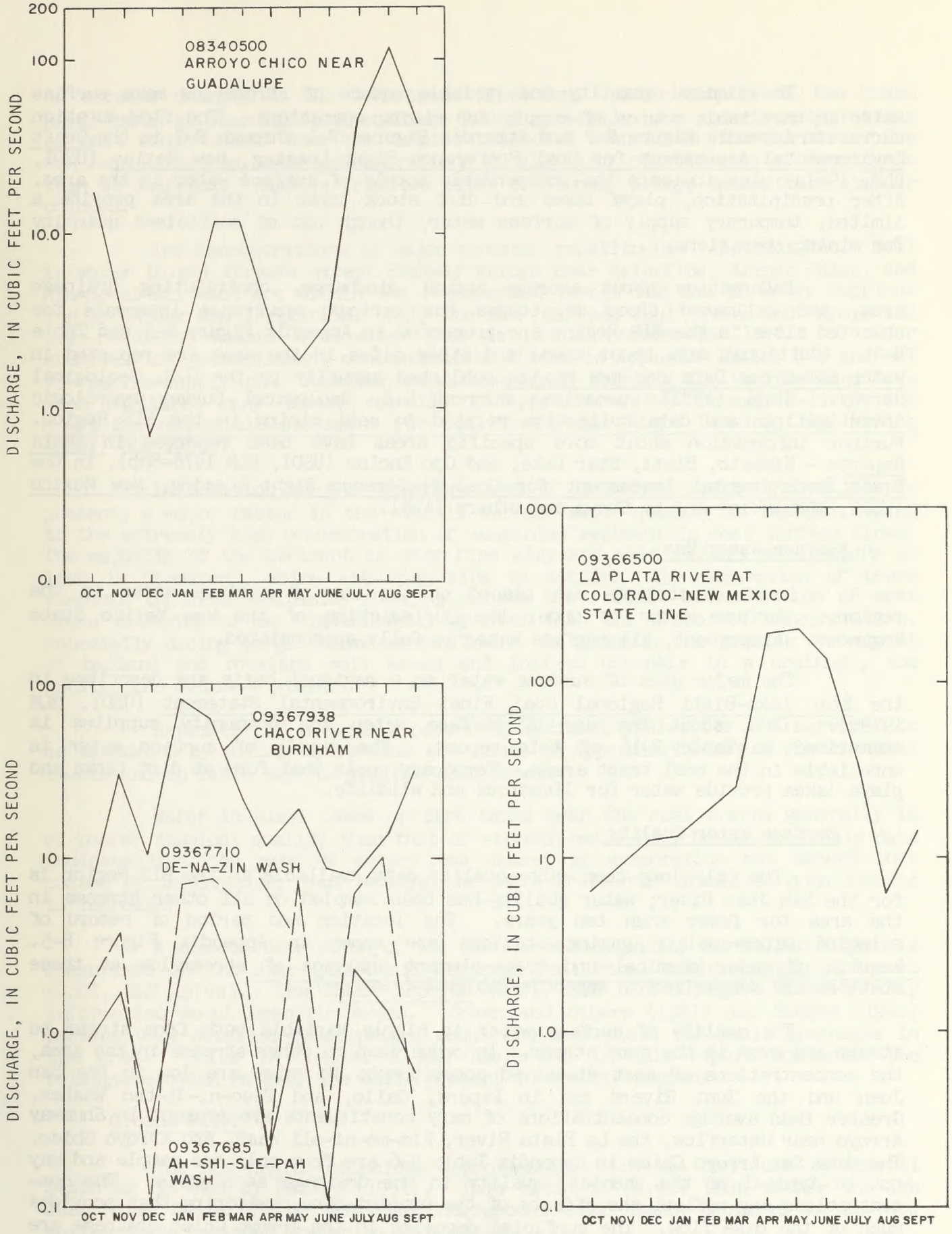


Figure 2-6

Average monthly streamflow at selected gaging stations.

The limited quantity and variable nature of streamflow make surface water an unreliable source of supply for mining operations. The flow-duration curves in Appendix Figure B-2 and Appendix Figures F-1 through F-7 in the Draft Environmental Assessment for Coal Preference Right Leasing, New Mexico (USDI, BLM, 1981a) also indicate the undependable supply of surface water in the area. After precipitation, playa lakes and dirt stock tanks in the area provide a limited, temporary supply of surface water, though not of sufficient quantity for mining operations.

Information about average annual discharge, contributing drainage area, and estimated flood magnitudes for various recurrence intervals for selected sites in the EIS Region are presented in Appendix Figure B-3 and Table B-4. Additional data about these and other sites in the area are reported in Water Resources Data for New Mexico published annually by the U.S. Geological Survey. Hejl (1982) summarizes current U.S. Geological Survey hydrologic investigations and data collection related to coal mining in the EIS Region. Further information about more specific areas have been reported in EMRIA Reports - Kimbeto, Bisti, Star Lake, and Ojo Encino (USDI, BLM 1976-80b), in the Draft Environmental Assessment for Coal Preference Right Leasing, New Mexico (USDI, BLM 1981a) and by Shown and others (1981).

Surface Water Use

Legal constraints are placed on the use of surface water in the region. Surface water is under the jurisdiction of the New Mexico State Engineer. At present, all surface water is fully appropriated.

The major uses of surface water on a regional basis are described in the Star Lake-Bisti Regional Coal Final Environmental Statement (USDI, BLM 1979c). Data about the use of surface water for community supplies is summarized on Table 2-16 of this report. The supply of surface water is unreliable in the coal tract areas. Temporary pools that form at dirt tanks and playa lakes provide water for livestock and wildlife.

Surface Water Quality

The only long-term water-quality data available in the EIS Region is for the San Juan River; water quality has been sampled on all other streams in the area for fewer than ten years. The location and period of record of selected water-quality gaging stations are shown in Appendix Figure B-5. Results of major chemical and trace-element analyses of streamflow at these stations are summarized in Appendix Tables B-6 and B-7.

The quality of surface water is highly variable both from stream to stream and even in the same stream. In comparison to other streams in the area, the concentrations of most dissolved constituents in water are low in the San Juan and the Zuni Rivers and in Papers, Gallo, and Teec-ni-di-tso Washes. Greater than average concentrations of many constituents are present in Shumway Arroyo near Waterflow, the La Plata River, Kim-me-ni-oli Wash, and Arroyo Chico. The data for Arroyo Chico in Appendix Table B-6 are from only one sample and may not be typical of the chemical quality in the drainage as a whole. The concentrations may reflect the effects of the uranium-mine dewatering that provides much of the base flow. The surficial deposits in the Arroyo Chico drainage are similar to those in the Chaco drainage; thus, the quality of natural streamflow in the area is expected to be similar to that of the Chaco. The water quality

of streams changes in the downstream direction. Water samples of the Chaco River taken at Star Lake and at Chaco Canyon generally have lower concentrations of most constituents than the samples collected downstream near Burnham. The San Juan River has lower concentrations of all major constituents at Farmington than at Shiprock. Samples from two sites on Shumway Arroyo demonstrate similar changes.

The concentrations of major chemical constituents (Appendix Table B-6) in water in all streams except Shumway Arroyo near Waterflow, Arroyo Chico, and Kim-me-ni-oli Wash are within the recommended levels for use as water supplies for livestock and irrigation. Only the San Juan and Zuni Rivers and Papers and Teec-ni-di-tso Washes have water that is within recommended levels of major chemical and trace-element concentrations listed in Appendix Tables B-6 and B-7 for public-supply use. Recommended water-quality criteria for various uses have been published many times, recently in Appendicies F-9 through F-11 in the Draft Environmental Assessment for Coal Preference Right Leasing, New Mexico (USDI, BLM 1981a).

In addition to the concentrations of dissolved chemical constituents present, a major factor in the overall surface-water quality in the EIS Region is the extremely high concentration of suspended sediment in most surface flows. The majority of the sediment is very fine clay and silt (0.0625 millimeters or less in diameter), which are very slow to settle. The adsorption of trace elements on these sediments commonly causes the "total" concentration of most trace elements to be significantly greater than the dissolved concentration, especially during large volume streamflows. In general, the greater the amount of badland and rockland soil areas and incised channels in a drainage, the greater the sediment yield.

Estimates of naturally occurring sediment yields for the acreages to be disturbed by mining operations are shown in Appendix Table B-8 for the PRLA tracts and in Table B-9 for the EIS coal tracts.

Water in playa lakes or dirt tanks near the coal tracts generally is of poorer chemical quality than that of streamflows. The limited available data indicate that the rate of water loss caused by evaporation may exceed that caused by infilration; thus causing the concentration of dissolved constituents to increase.

A general decription of the surface-water quality in the EIS Region is summarized in the Star Lake-Bisti Regional Coal Final Environmental Statement (USDI, BLM 1979c). The EMRIA Reports (USDI, BLM 1976-80) give water-quality information about specific areas. Shown and others (1981) and Summer (1981) present very detailed descriptions about sediment yield for small drainages in the area. Soils in Chapter 2 and Table 2-6 in this report summarize the relative erosion rate of the soils present in the EIS Region.

Ground Water

The EIS Region coincides approximately with the San Juan Structural Basin as defined by Kelley (1951). This basin is larger than either the San Juan River Basin or the San Juan Underground Water Basin declared by the New Mexico State Engineer (refer to Figure 2-7).

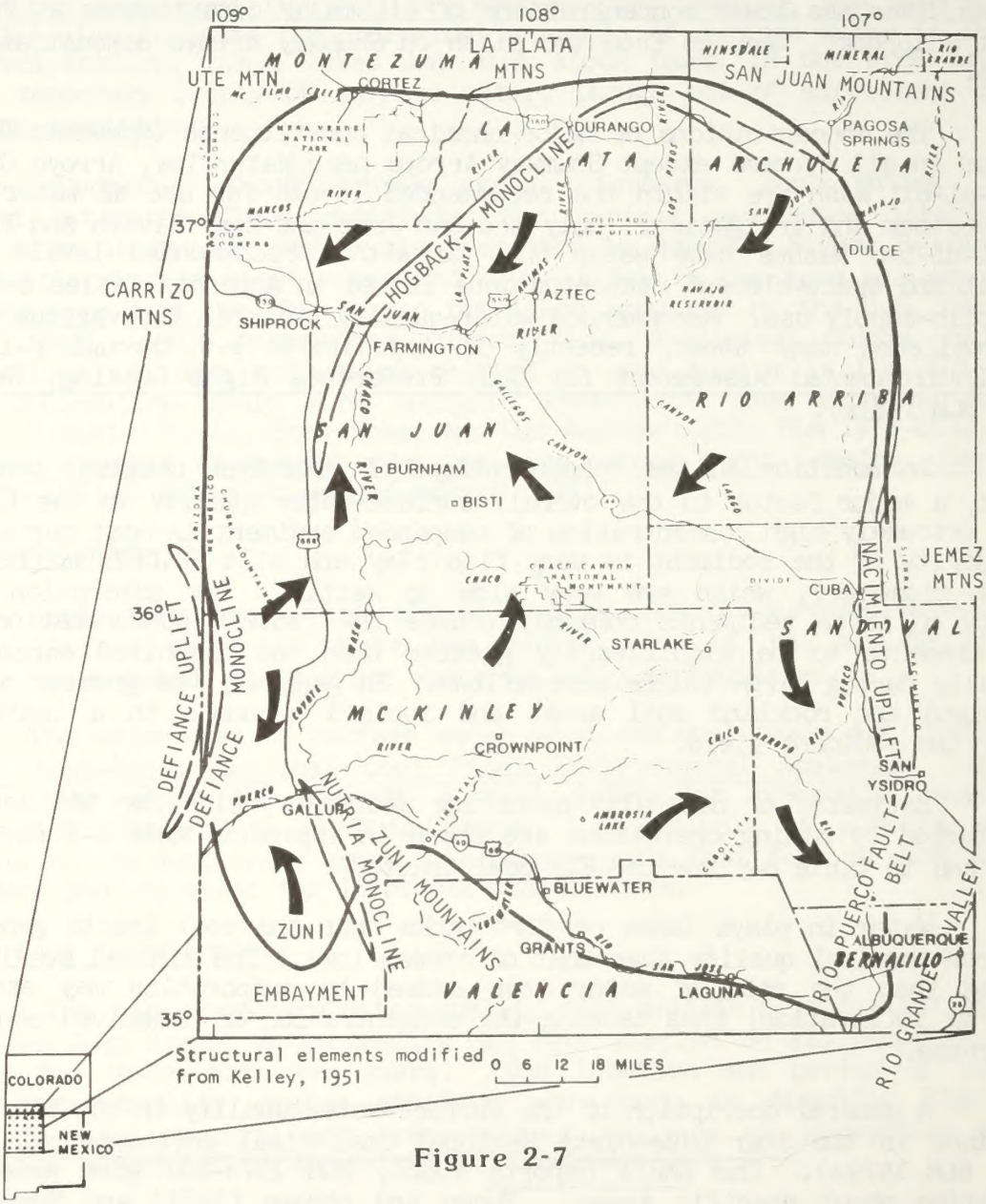


Figure 2-7

STRUCTURAL ELEMENTS OF THE SAN JUAN BASIN LOCATION OF THE EIS AREA, AND GENERALIZED DIRECTIONS OF GROUND-WATER MOVEMENT (INDICATED BY ARROWS)

Source: Modified from Lyford, 1979.

Generally the bedrock aquifers crop out on the topographically and structurally higher margins of the basin and dip underground towards the central, lowest part of the basin (refer to Figure 2-8). Alluvium (valley fill deposits) occurs in most of the stream channels of the basin.

Most recharge to the aquifers generally takes place on their outcrop areas by infiltration of precipitation and runoff. Water in bedrock aquifers flows from recharge areas (where it occurs under water-table conditions) generally downdip towards the basin center (where it occurs under artesian conditions). Movement of ground water between aquifers may occur via numerous faults that exist throughout the basin. Water in alluvium flows downslope in the same direction as streamflow.

Natural discharge of ground water from San Juan Structural Basin aquifers generally occurs as the water moves towards the Four Corners region and the Rio Grande Valley. Some ground water moves southwest towards the Puerco River near Gallup (refer to Figure 2-7). Lyford (1979) provided an excellent general description of San Juan Basin ground water hydrology. Stone, et al. (in press) present detailed information about this hydrology.

Wells can be used to supply water for stock use in most of the San Juan Structural Basin, but yields are frequently small and water quality is commonly marginal. At least 20 bedrock geologic units are known to yield water to wells.

Ground Water Quality

The quality of ground water in the EIS Region generally ranges from fresh to moderately saline (classification of Swenson and Baldwin, 1965). In many areas of the San Juan Structural Basin, the total-dissolved-solids concentration exceeds the Environmental Protection Agency's recommended limit of 1,000 milligrams per liter (mg/l) for potable water (EPA 1972).

The quality of water in bedrock aquifers is commonly best near the outcrop, or recharge, areas of those aquifers. Water quality tends to decrease with distance from outcrops because the water dissolves minerals in the rocks as it flows through them. These water quality trends have been shown by Lyford (1979) and Craigg (1980).

The quality of water in the alluvium is generally better than that from bedrock aquifers. Total dissolved solid concentrations range from less than 1,000 mg/l in headwater areas to more than 2,000 mg/l in downstream reaches (Lyford, 1979). Table 2-7 summarizes water-quality data for major aquifers in the San Juan Structural Basin.

Aquifers Associated with EIS Region Coal Tracts

The tracts are located in three hydrostratigraphically distinct areas of the San Juan Structural Basin. These three areas coincide with the outcrops of the three main coal-bearing geologic units in the basin. These units are the Fruitland Formation coal trend (Star Lake-Bisti regions), Menefee Formation coal trend (Torreon-Arroyo Chico-Lee Ranch regions), and the Menefee-Crevasse Canyon Formation coal trend (Crownpoint-Gallup regions). Different aquifer combinations underlie each of these areas. Shomaker and Stone (1976) identified major and minor potential aquifers associated with these three regions.

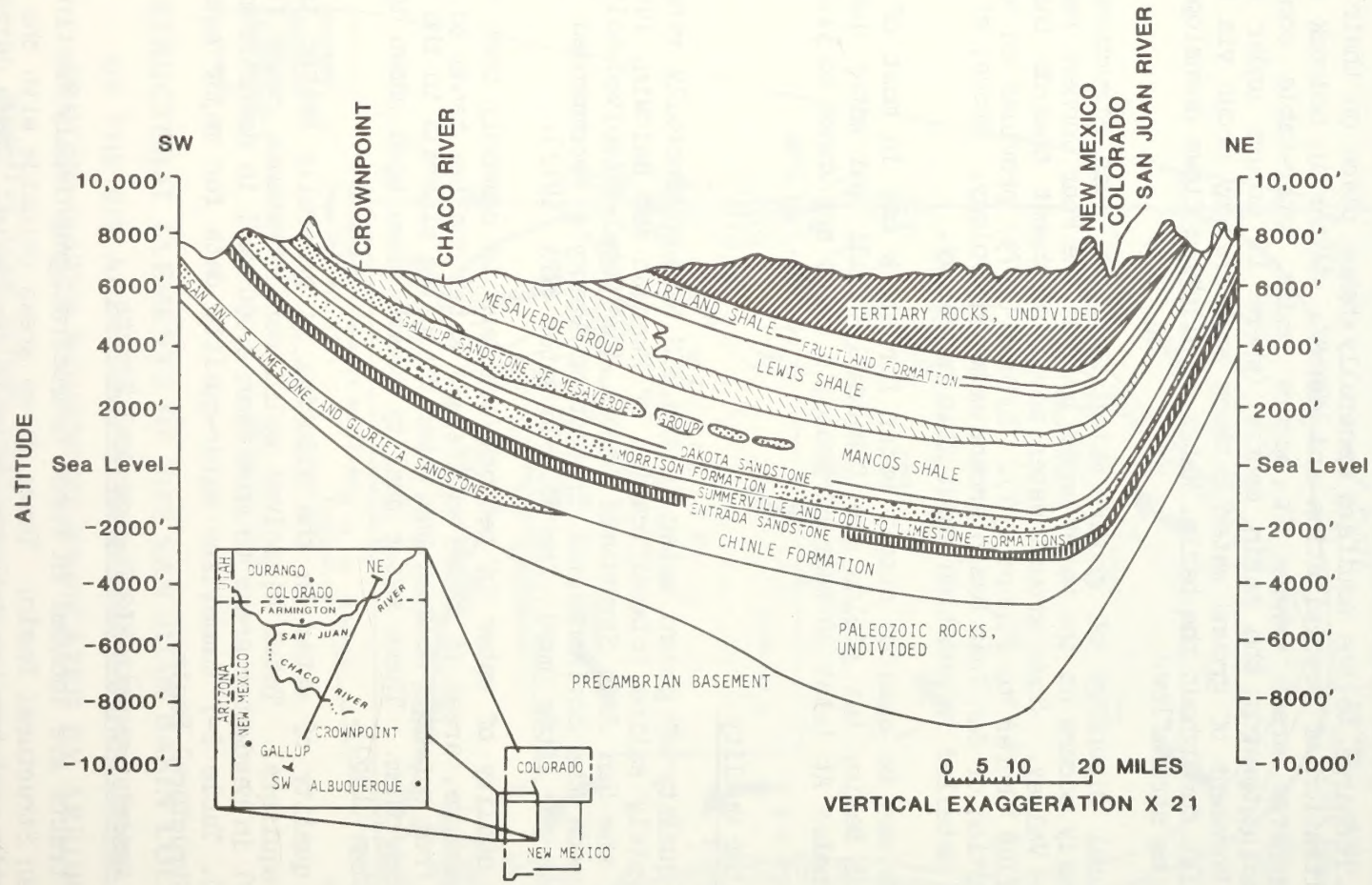


Figure 2-8. Generalized Geologic Section Showing Major Aquifers in the San Juan Basin

Note: (Aquifers are indicated by areas with visual patterns)

Source: Lyford 1979.

TABLE 2-7

HYDROGEOLOGIC CHARACTERISTICS
OF MAJOR AQUIFERS IN THE SAN JUAN BASIN

Aquifer	Formation Thickness (ft)	Transmissivity [a] (ft^2/day)	Specific Capacity [a] (gal/min/ft)
Alluvium	0-100	>40,000 (Along San Juan, La Plata, and Animas Rivers)	
		<1,000 (Along ephemeral streams)	
San Jose Formation	0-3,000	150+	
Nacimiento Formation	800-2,000		
Ojo Alamo Sandstone	0-400	57-165	0.2-1.02
Fruitland Formation	0-500		
Pictured Cliffs Sandstone	75-375		0.02-0.07
Cliff House Sandstone		<50-100	0.05-0.12
Menefee Formation	100-2,000	25-50	0.03-1.38
Point Lookout Sandstone	75-350	<50-100	0.07-1.12
Crevasse Canyon Formation	100-1,000	<50-100	0.03-0.64
Gallup Sandstone	0-500	<100-270	0.03-4.7
Dakota Sandstone	0-250		0.05-0.2
Westwater Canyon Member of Morrison Formation	50-400	36-510	0.27-1.6
Entrada Sandstone	50-400	<50-300	0.02-3.5

Source: USDI, BIA 1980; USDI, BLM 1979; Lyford 1979; Woodward-Clyde 1982; Craigg 1980.

Note: [a] Refer to Glossary for a definition of these terms.

Major potential aquifers underlying the Fruitland coal trend are the Gallup Sandstone west of R. 11 W. (of Cretaceous age), the Westwater Canyon Member of the Morrison Formation, and the Entrada Sandstone (both Jurassic). Minor potential aquifers are the Pictured Cliffs, Cliff House, Point Lookout, and Dakota Sandstones (all Cretaceous).

Major potential aquifers in the Menefee-Crevasse Canyon coal trend (Shomaker and Stone, 1976) are the Dalton Sandstone Member of the Crevasse Canyon Formation, "Stray" sandstone, Gallup Sandstone (all Cretaceous), and the Westwater Canyon Member of the Morrison Formation (Jurassic). One minor potential aquifer is the Dakota Sandstone (Cretaceous). The Point Lookout Sandstone (Cretaceous) should also be considered as a minor potential aquifer for this coal trend.

The coal-bearing formations themselves are also important aquifers locally. The Ojo Alamo Sandstone, Nacimiento Formation, and the San Jose Formation are potential aquifers, especially along the Fruitland Formation coal trend. Quaternary alluvium is an important local aquifer in all the EIS Region. Hydrogeologic characteristics and water-quality data for these aquifers are summarized in Tables 2-7 and 2-8.

Ground Water Use

Ground water in the EIS Region is withdrawn for various purposes, the most predominant of which include uranium mine dewatering (mostly from the Westwater Canyon Member of the Morrison Formation), milling of ore, various industrial activities, municipal supplies, rural domestic needs and livestock watering.

Legal constraints are placed on the use of ground water in the region. Use is administered by the New Mexico State Engineer, who has declared four Underground Water Basins within the San Juan Structural Basin. These are the San Juan, Bluewater, Gallup, and Rio Grande Underground Water Basins. Once an area has been designated as an Underground Water Basin, permits must be obtained from the State Engineer before ground water may be appropriated. Permits are issued only after public notice and are subject to protest by parties holding prior existing water rights.

Floodplains

The Federal Insurance Administration (FIA) has mapped the floodplains associated with each major drainageway in the EIS Region. Table B-1 in Appendix B summarizes approximate floodplain acreages for these drainageways, based on the FIA's Flood Hazard Boundary Maps. Floodplain acreages are approximate and were calculated only for those tracts identified as surface-mineable by the Minerals Management Service. For maps showing the areal distribution of floodplains within each surface-mineable tract, the reader is referred to file material in the BLM Farmington Resource Area Office.

Development in floodplains is uncommon, but usually consists of fencelines or shallow wells completed in alluvium. Single-family dwellings may exist in some floodplain areas.

TABLE 2-8
PHYSICAL PROPERTIES AND CHEMICAL QUALITY
OF MAJOR AQUIFERS IN THE SAN JUAN BASIN [a]

Aquifer	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium & Potassium (Na+K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved Solids	Total Hardness (Units)	pH	Temperature (°C)
Alluvium	4.1-63	0-6.6	4-2,870	0.8-2,040	5.5-12,000	34-1,000	2.5-8,890	2-27,500	0-11	0-439	143-47,100	18-15,500	7.3-8.3	4-21
San Jose Formation	7.6-28	0.02-14	1.6-365	0-67	29-745	120-814	71-1,430	3.2-87	0.2-4.0	0-25	323-2,520	4-1,960	6.5-9.2	9-14
Nacimiento Formation	14-22	0.02-0.58	0-385	0-50	3-2,415	0-478	6.2-5,455	1-145	0-4	0.2-5.7	56-14,150	30-966	6.9	12
Ojo Alamo Sandstone	9.6-39	0-2.1	1.6-548	0-126	23-788	0-888	0.4-2,440	0.8-923	0.3-1.8	0-70	275-4,010	4-1,860	6.5-8.9	2-14
Pictured Cliffs Sandstone	11-20	0-0.24	1.9-425	1-217	50-16,600	209-2,400	7.3-4,400	19-26,600	1.2-5.5	0-8.6	383-44,200	11-1,950	7.4-9.1	3-19
Ciff House Sandstone	2.7-19	0-0.01	2.2-280	0.7-170	26-6,140	0-1,250	350-8,230	7-4,210	0-8.1	0.1-2.5	849-3,120	8-1,600	4.3-8.9	13-18
Menefee Formation	5.1-21	0-1.1	1-168	0-34	8-2,620	92-1,890	1.8-3,930	1.5-956	0-12	0-19	129-7,780	4-534	7.4-9.1	12-21
Point Lookout Sandstone	0.05-39	0-0.31	0-684	0.4-267	13-833	116-826	3.8-3,410	2.2-113	0.2-3.7	0.1-14	149-5,080	5-2,800	7.4-10.0	13-21
Crevasse Canyon Formation	5.5-24	0-3.6	1.3-630	0-245	0.9-1,002	122-1,030	9.2-2,980	1.4-94	0-2.0	0-427	243-4,470	4-3,100	6.8-9.1	12-20
Gallup Sandstone	10-38	0.02-15	1-456	0-268	16-1,690	85-763	17-2,854	4-1,940	0-6.8	0-40	285-4,400	4-2,240	7.2-8.8	9-42
Dakota Sandstone	6.5-42	0-7.8	1.5-330	0.9-103	5.8-1,430	130-1,600	7.8-3,540	6-500	0.1-10	0.1-10	165-5,560	9-1,080	7.2-8.4	13-23
Westwater Canyon Member Morrison Formation	6.2-29	0-4	1.2-373	0.2-188	9.2-1,430	60-1,200	11-3,540	0.8-374	0-1.4	0-200	168-5,560	4-1,700	7.2-9.2	14-52
Bluff Sandstone	7.4-18	0-0.39	7.5-221	2.2-106	24-949	168-898	17-2,380	12-118	0.2-5.1	0.1-18	264-3,760	20-988	7.5-8.3	11-24
Entrada Sandstone	9.1-27	0.09	1.2-262	0.2-64	15-543	83-539	5.8-1,930	5-2,230	0.2-1.6	0-33	196->5,000	4-916	9.2	17
Chinle Formation	3.9-45	0-1.2	0.4-304	0.5-587	1.2-5,740	34-1,150	16-4,110	5-9,590	0.1-5.9	0-129	171-6,410	3-3,170	6.8-9.1	12-20
San Andres Limestone	6.7-23	0-1.2	60-266	14-128	1.2-426	161-702	11-1,030	4-254	0-0.8	0-105	272-2,370	72-1,040	6.7-8.2	11-46
Glorieta Sandstone	8.2-13	3.4-4.1	100-183	15-87	9.2-1,330	184-265	230-637	5-1,980	0.1-0.8	0-1.7	567-4,330	412-779	7.2	13-26

Source: USDI, BLM, BR AND GS 1976.

[a] Units of concentration are parts per million (ppm).

VEGETATION/THREATENED, ENDANGERED & SPECIAL INTEREST PLANTS/ LIVESTOCK GRAZING

Vegetation

Vegetation for the 39 tracts is represented by 11 vegetation types. The vegetation types are sagebrush, pinyon juniper, grassland, greasewood, fourwing saltbush, salt flats-halophytic, riverwash-wetland, duneland, ponderosa pine, badland and rock outcrop. These vegetation types are discussed in Appendix C. For more information about the occurrence of these vegetation types, refer to the Chaco-San Juan Planning Unit Resource Analysis--Update for Coal (USDI, BLM 1980b).

Threatened, Endangered and Special Interest Plants

There are no known populations of federally-listed threatened or endangered plant species in the EIS Region. Potential habitat for Mesa-verde cactus (Scherocactas mesa-verdae), associated with Mancos Shale outcroppings, exists in Bisti 1, 2, and 6/8 tracts. The Manocs Shale occurs specifically in the following areas; Bisti 1, T. 23 N., R. 13 W., Section 1: N1/2; Bisti 6/8, T. 23 N., R 13 W., Section 17: NW1/4; Bisti 2, T. 24 N., R. 13 W., Section 28: NW1/4: Bisti 2, T. 24 N., R. 13 W., Section 29: N1/2; Bisti 2, T. 24 N., R. 13 W., Section 30: S1/2; Bisti 2, T. 24 N., R. 13 W., Section 31: N1/2. A 1982 printout from the New Mexico State Heritage Program shows no location of these species in the mining areas but identifies Astragalus wingatus, a State sensitive species, and proposed federal Threatened or Endangered Species on the Catalpa Canyon and Hogback tracts.

Livestock Grazing

Livestock grazing has been historically, and is presently, the primary use of the EIS Region. On most of the community allotments within the region, the majority of operators are individual Navajo family units who run small bands of sheep and goats. Many operators reside on or near the allotment(s) their livestock graze, and herd their livestock to and from their dwellings daily.

The complex surface ownership pattern in the EIS Region has severely limited livestock management by the BLM. Only those public land blocks with little or no interspersed Indian allotted lands are currently managed by the BLM.

Indian grazing allotments with small scattered tracts of public lands are administered by the Bureau of Indian Affairs (BIA) through a cooperative agreement with the BLM. The BLM leases these allotments to the Navajo Tribe, and has set carrying capacities for the public lands within the allotments. More information concerning these allotments is on file at the Farmington Resource Area Office and the BIA office in Crownpoint (Chaco-San Juan URA Update for Coal).

WILDLIFE/THREATENED OR ENDANGERED ANIMALS

The BLM and the State of New Mexico have not identified important habitat in the EIS Region for any wildlife species. In the southern portion of the region (the area encompassing all the tracts except the La Plata tracts), relatively few big game (except in Bread Springs, Pinehaven, Twin Butte) and non-game animals occur except during the migration of song birds. No riparian and little cottonwood-type habitat associated with washes exists in the EIS Region. A list of wildlife found in the region may be found in the Chaco-San Juan Planning Unit Resource Analysis--Update for Coal (USDI, BLM 1980b) on file at the BLM Farmington Resource Area Office.

In the northern part of the EIS Region, the BLM has identified important mule deer and elk winter range. Approximately 200 acres of this range is found on the La Plata #1 Tract, and 105 acres exist on the La Plata #2 Tract.

Within the PRLA Area, six raptor nesting sites have been identified (Appendix A-7). On the competitive coal tracts outside the PRLA Area, four raptor nesting areas were found (Appendix A-8).

The bald eagle uses aquatic habitats along the San Juan, Animas and La Plata Rivers and Navajo Reservoir. Use by eagles is documented as wintering only and no use has been noted in PRLA or lease areas. Potential habitat exists for the black-footed ferret. Gunnison's white-tailed prairie dog towns provide scattered habitats for ferrets throughout the coal lease area. A black-footed ferret survey was conducted by a biologist employed by the Public Service Company of New Mexico on a Gunnison's white-tailed prairie dog town of approximately 400 acres in size (T. 22 N., R. 12 W., Sections 2, 3). No ferret sign or activity was found (Berger, 1981, personal communication). Neither did biologists working for BIO/WEST, Inc. (1982) report ferret sign or activity at other locations.

A small spring on the Johnson Trading Post Tract provides important habitat for roosting long-eared owls and for migrating songbirds.

CULTURAL RESOURCES

Cultural resources consist of the fragile and nonrenewable remains of past human activity, occupation, or endeavors. These endeavors are reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, and natural features important in human events. Cultural resources span a period of at least 12,000 years. Archaeologists have divided this period into five temporal/cultural periods in the San Juan Basin.

The earliest evidence of humankind in the San Juan Basin is from PaleoIndian sites (10,000-5,000 B.C.). These sites indicate a cultural adaptation to the hunting of Pleistocene animals, including extinct bison and mammoth, the hunting of smaller game, and the gathering of wild edible plants.

The end of the Pleistocene and beginning of the Holocene are partially marked by the extinction of the larger mammals, along with a climatic change. Archaic period (5,000 B.C. - A.D 1) sites show an emphasis on the hunting of smaller game and a greater importance placed on the gathering of plants.

The transition towards a sedentary lifestyle and the adaptation of horticulture mark the beginning of the Anasazi culture (A.D. 1- A.D. 1300). The Chacoan Anasazi culture was present throughout the San Juan Basin between A.D. 900 and A.D. 1200. This cultural system included at least 80 communities and numerous smaller sites besides the pueblos within Chaco Canyon. The outlying communities contained multi-story structures ranging in size from 10 rooms to 100, while at Chaco Canyon, pueblos containing over 800 rooms were built .

Much of the San Juan Basin was abandoned between A.D. 1300 and 1500, when the Navajo Indians entered from the north-northeast. The final cultural group to enter the basin was the Euro-Americans in about 1550, led by Spanish missionaries and explorers. Later came Spanish and Anglo settlers. Further data on the cultural sequence in the San Juan Basin can be obtained in USDI, BLM (1979c), Huse et. al. (1978), Magers (1979), Delaney and Dosh (1981), and Kemrer (1981).

As shown in Table 2-9, 638 sites (741 components) have been recorded in the portions of the competitive coal lease tracts containing federal coal or federal surface. Of these, 346 are prehistoric, 376 are historic and 19 are components of unknown affiliation. Between 10 and 15 percent of the EIS Region overlying federal coal has been inventoried for cultural resources.

Site densities have been estimated for each tract, using a model developed for the BLM by the ESCA-Tech Corporation in 1981 and known site densities from surrounding areas. All of the predicted site densities involve extrapolation and are based on judgement rather than formal statistical procedures. Between 1,727 and 2,295 sites are predicted on these tracts. (Sites predicted to occur in the areas of private coal are not included.) Additional sites were located during the BLM Chacoan Roads project conducted during the summer of 1982 (in press), but site data from this project are unavailable at this time.

Sites recorded on the tracts represent all of the five temporal/ cultural periods. One PaleoIndian site has been recorded in the Bisti #2 tract, a portion of the indeterminate lithic scatters (lithic scatters without diagnostic artifacts) may have been made by PaleoIndians.

Thirty-four of the recorded components (see Glossary) have been assigned to the Archaic period, and additional Archaic sites may be represented in the indeterminate lithic scatters. The area between Bisti and Star Lake has been identified as an opportunity area for Archaic culture study due to the concentration of sites. Research here may provide important archaeological data on the Archaic occupation of the San Juan Basin.

The 158 Anasazi components date from Basketmaker II (A.D. 1-500) through Pueblo III (A.D. 1100-1300), with the highest frequency being Pueblo II (A.D. 900-1100). A portion of the indeterminate lithic scatters may also be Anasazi.

TABLE 2-9
CULTURAL RESOURCES ON THE COMPETITIVE COAL LEASE TRACTS

Tract Name	Total Sites b/		Source of Prediction c/	Percent Inventoried	Site Component Affiliation										Sites Recommended National Register Eligibility	
	Known	Predicted			Paleo-Indian	Indeterminate Lithic	Archaic	Anasazi	Navajo	Euro-American	Unknown Historic	Unknown	Total	Chacoan Road Miles	Eligible	Not Eligible
PRLAs a/	171	542+	2	20%	2	64	34	38	46	1	8		194	26.1	133	37
La Plata #1	8	15	1	15%				6		1	1		8		8	
La Plata #2	4	15	1	20%				4			1		5		3	1
La Plata #3	9	15	1	13%				3				6	9		9	
La Plata #4	18	45	1	25%		1		10	1	4	2	2	20		17	1
Crownpoint Northeast	38	110	1	10%				11	29	1		3	44	0.3	18	20
Twin Buttes	6	234	1	10%				1	5				6		2	4
Johnson Trading Post	9	23-48	1	10%		1			7		1		9		2	7
Pinehaven	19	191	1	10%		3	1	11	6		3		24		17	2
Hospah #1	4	33	1	2%		1					3		4		3	1
Hospah #2	0	13	1	12%												
Kimbeto #1	6	50-60	3	20%		3	1		3				7		6	
Kimbeto #2	3	8	2	10%		2		1	1				4		3	
Samson Lake #1	48	32-147	1	12%				11	37		2		50		14	34
Samson Lake #2	26	16-73	1	12%				7	20				27		8	18
Gamerco #1 (LC)	6	1-6	1	10%				4	7				11		3	3
Gamerco #1 Bypass (LC)	4	3-13	1	10%				4	2				6		4	
Gamerco #2	10	17-76	1	2%				8	9				17		7	3
Divide	26	48-105	1	26%		7	1	15	21	5	3	3	55		39	9
Star Lake East #1	33	15-35	1	33%		10	1	1	7		1		19		13	4
Star Lake East (LC)	16	15-31	1	10%		6	1		8				16		7	9
Star Lake West #2	6	6-13	1	15%												
Crownpoint East	36	28-208	1	12%		1			30	2	2	2	38		4	32
Bisti #1	78	43	2	100%		40	10	3	7	2	8		93		67	11
Bisti #2	35	12	2	55%	1	20	7	2	17				46		28	7
Bisti #4	7	20-86	3	6%		5			1				7		5	2
Bisti #6	2	14	2	1%			1		1				2		2	
Gallo Wash #1	0	6	2	10%												
Gallo Wash #2	11	6	2	15%		5		1	6			1	13		8	3
Lee Ranch East	0	7	1	0%				1						0.3		
Lee Ranch Middle	23	32-43	1	18%		14	4	2		3	2		25		21	2
Lee Ranch West	28	70-100	1	10%		15	3	4		6	16		34		25	3
Tah-ha-bah Well	16	67	1	10%				1	17				18		3	13
Bread Springs #1	0	16	1	0%												
Bread Springs #2	0	27	1	0%												
Sundance	17	23	1	69%				2	14		1		17		16	1
Catalpa Canyon	0	0	1	100%											4	
Chico Wash South	4	76	1	1%		3		2	1			1	6		71	11
Nageezi	82	336	3	20%		16	4	20	49		11	2	101	2.5		
Hogback	0	39	1	0%												
TOTALS	638	1,727-2,295			1	153	34	158	306	24	46	4	741	3.1	437	201

a. PRLA figures not included in totals.
b. Percent inventoried and total sites are for federal surface and/or lands overlying federal coal.
c. 1. Predicted site number from within, adjacent or nearby site data.
   2. Predicted site number from Kerer, 1981.
   3. Predicted site number from combination of above two sources.

During the Bonito Phase of the Anasazi period, outlying sites across the San Juan Basin were connected to Chaco Canyon by an extensive network of roadways. Archaeologists are only beginning to realize the complexities of this site and road network, sometimes called the "Chaco Phenomenon", which has received national and international attention. The major sites along these roads and other large Bonito-phase sites are referred to as "Chacoan Outliers." The large multi-story pueblos of Chaco Canyon (Chaco Cultural National Historical Park) are believed to be the center of this social and economic system. Several of these structures currently have standing walls up to three or more stories in height. Similar structures are present at the detached parcels of the park. Seven coal tracts are within 10 miles of the park.

The Pierre's Ruin Community, a Chacoan outlier, is partially within the Nageezi Tract. The boundaries of the Pierre's Ruin Community is illustrated in Figure 2-9. A total of 440 acres has been included as a protection site under Public Law 96-550, and 420 acres of the protection site plus an additional 540 acres have been nominated to the National Register of Historic Places. An additional 580 acres are proposed for inclusion into P.L. 96-550. Of this 580 acres, 160 acres are within the National Register nomination area. The BLM and the National Park Service have discussed the possibilities of developing the Pierre's Ruin Community for visitor interpretation along with Chaco Canyon (the Chaco Culture National Historical Park) and the Chacoan Outliers.

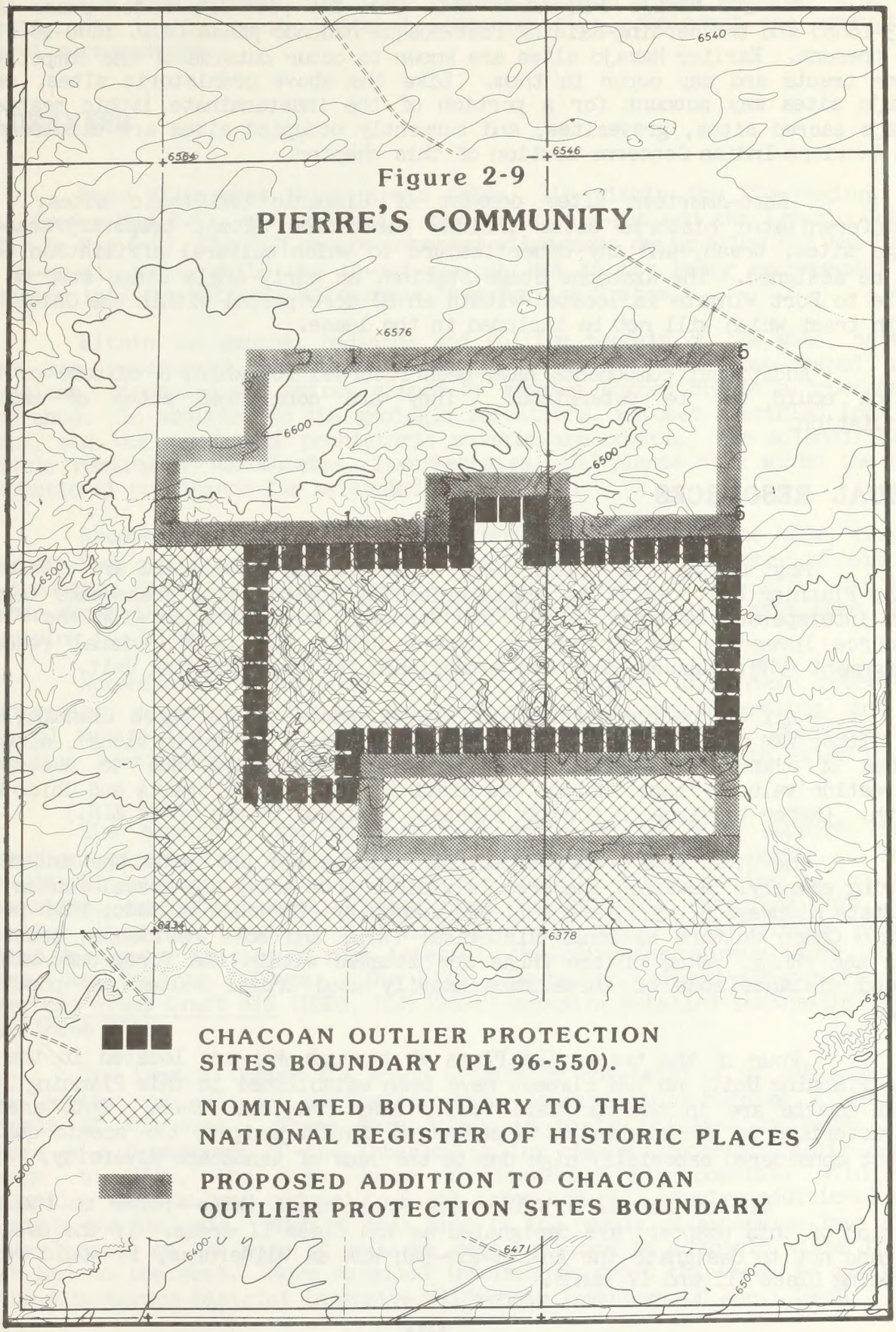
In addition to Pierre's Site, 32 other Chacoan outliers were identified as Archeological Protection Sites under P.L. 96-550. Less than 5 miles from lease tracts are Morris 41, Raton Wells and Bisa'ani. The Holmes Group to the southeast of the La Plata tracts is also a potential Protection Site.

Over the past 2 years BLM has conducted a study on the Chacoan Roads. The project's initiation was prompted by the recognition of the importance of Chacoan roads, and the need to develop an effective management program for them in the light of widespread existing and proposed surface-disturbing activities such as coal extraction. This study has basicly mitigated the impacts of surface coal mining on the known Chacoan roads.

Prehistoric Chacoan roads pass through three tracts: Nageezi, Crownpoint Northeast, and Bisti #4. Archaeological studies of the road segments on the Nageezi and Crownpoint Northeast tracts have recorded several small sites associated with the roads and definable road segments (BLM, in press). The features and definable segments have been assigned site numbers, but the roads themselves do not have numbers. A probable extension of the Ah-shi-sle-pah road has been field checked in the Bisti #4 tract and tentatively identified as a prehistoric feature. Additional archaeological survey by the Chaco Roads Project staff (BLM, in press), during 1982, has revealed that the southeast road from the Greenlee site (south) does not exist. Earlier photo interpretation had identified a road connecting the Greenlee site to the San Mateo area, crossing the Hospah #1 and Lee Ranch West tracts. Ground truthing, however, indicated that none of the imaged segments were of prehistoric origin. A spur off of the Southeast road, going from the Greenlee site to Kin Ya'a, crossing the Crownpoint East tract had also been interpreted from aerial photos. Reconnaissance along these segments indicated that they are historic features.

Figure 2-9

PIERRE'S COMMUNITY



The 306 Navajo components date from the post-Gobernador phase (A.D. 1753-1868) and the Herding-Raiding/Post-Bosque Redondo phase (A.D. 1800-1881) to the present. Earlier Navajo sites are known to occur outside of the competitive lease tracts and may occur in them. Like the above prehistoric sites, early Navajo sites may account for a portion of the indeterminate lithic scatters. Navajo sacred sites, gravesites, and currently occupied sites are discussed in the American Indian Concerns section of this chapter.

Euro-American sites consist of Hispanic and Anglo sites. The undifferentiated historic sites include habitation sites, temporary/seasonal usage sites, trash, and any other feature to which cultural affiliation could not be assigned. The Azabache Stage Station, an early Anglo Stage stop on the route to Fort Wingate is located within an 80 acre parcel within the Chico Wash South tract which will not be included in the lease.

Additional components have been recorded for which a culture or time period could not be determined. They are considered sites of unknown affiliation.

VISUAL RESOURCES

Most of the coal tracts under consideration in this EIS are within the Chaco Planning Unit, which is characterized by low, rolling grass-sage terrain with interspersed badlands, mesas, and washes. In accordance with the Visual Resource Inventory and Evaluation System (USDI, BLM 1978), visual resource management (VRM) classes have been established for this Planning Unit.

All of the competitive coal lease tracts in the Chaco Planning Unit are either VRM Class III or IV (refer to the Glossary for definitions), although a few of them are important from a scenic standpoint due to associated recreation values. These include the Bisti #2, #4, and #8 tracts and Chico Wash South. (Refer to Visual B for VRM classes, enclosed in the Draft EIS.)

The PRLA Area receives minimal recreation use with the intent of viewing scenery. However, the area is visible from heavy use travel routes such as State Highways 57, 371, and 197; the community of Pueblo Pintado; high points within Chaco Culture National Historical Park; and some residences scattered near the PRLAs. Some of the PRLAs are located within the foreground/middle-ground distance zone of these more heavily used travel routes and populated areas.

Four of the tracts (La Plata #1 through #4) are located in the San Juan Planning Unit; no VRM classes have been established in this Planning Unit. These tracts are in the La Plata Valley away from the river. This area is characterized by pastureland with scattered pinyon-juniper; the scenic quality is not considered especially high due to the lack of landscape diversity.

All of the BLM's Wilderness Study Areas (WSAs--refer to the next section of this chapter) are designated as VRM Class II Areas. If the decision is made not to designate the Ah-shi-sle-pah WSA as wilderness, it would revert to being Class III and IV lands.

The area encompassing Chaco Canyon is also a VRM Class II Area and contains some highly scenic cultural resources that complement the attractive natural surroundings.

WILDERNESS

Four Wilderness Study Areas (WSAs) lie within the EIS Region; the Bisti (refer Map 2-3), the De-na-zin, the Ah-shi-sle-pah and the Ignacio Chavez (refer to Map 2-4). The BLM has recommended wilderness designation for the Bisti and De-na-zin WSAs, while the Ah-shi-sle-pah WSA is not being recommended for inclusion into the National Wilderness Preservation System.

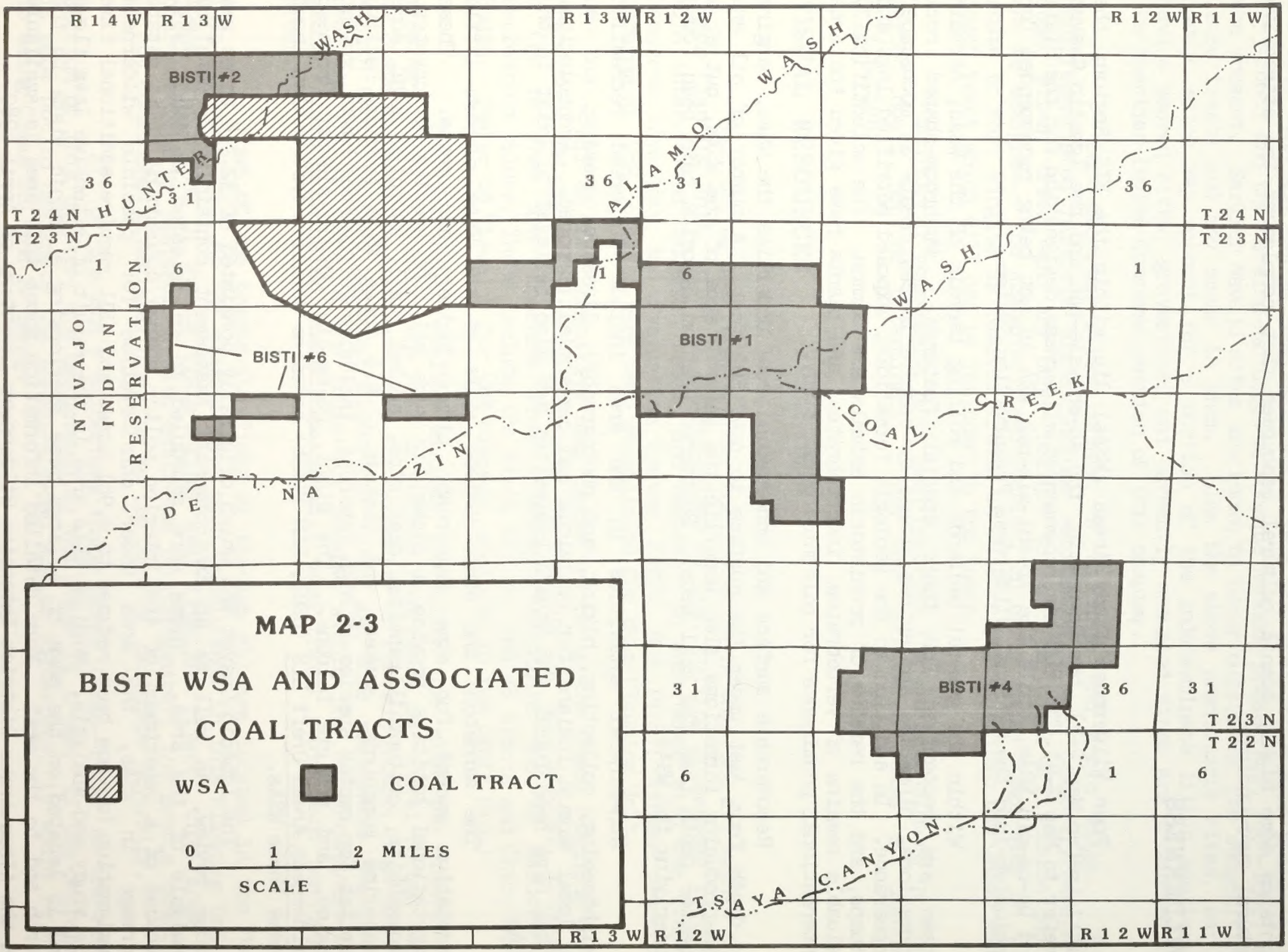
Within the general badlands and rolling terrain of the WSAs, certain areas are recognized for their special features. Mushroom-shaped rock formations, pinnacles and spires shaped by erosive forces create a "moonscape" appearance. In addition to the geologic formations, exposed petrified logs and stumps, and the remains of prehistoric animals are common. The scientifically valuable remains of vertebrates, invertebrates, and plants have given the area international prominence for paleontological study.

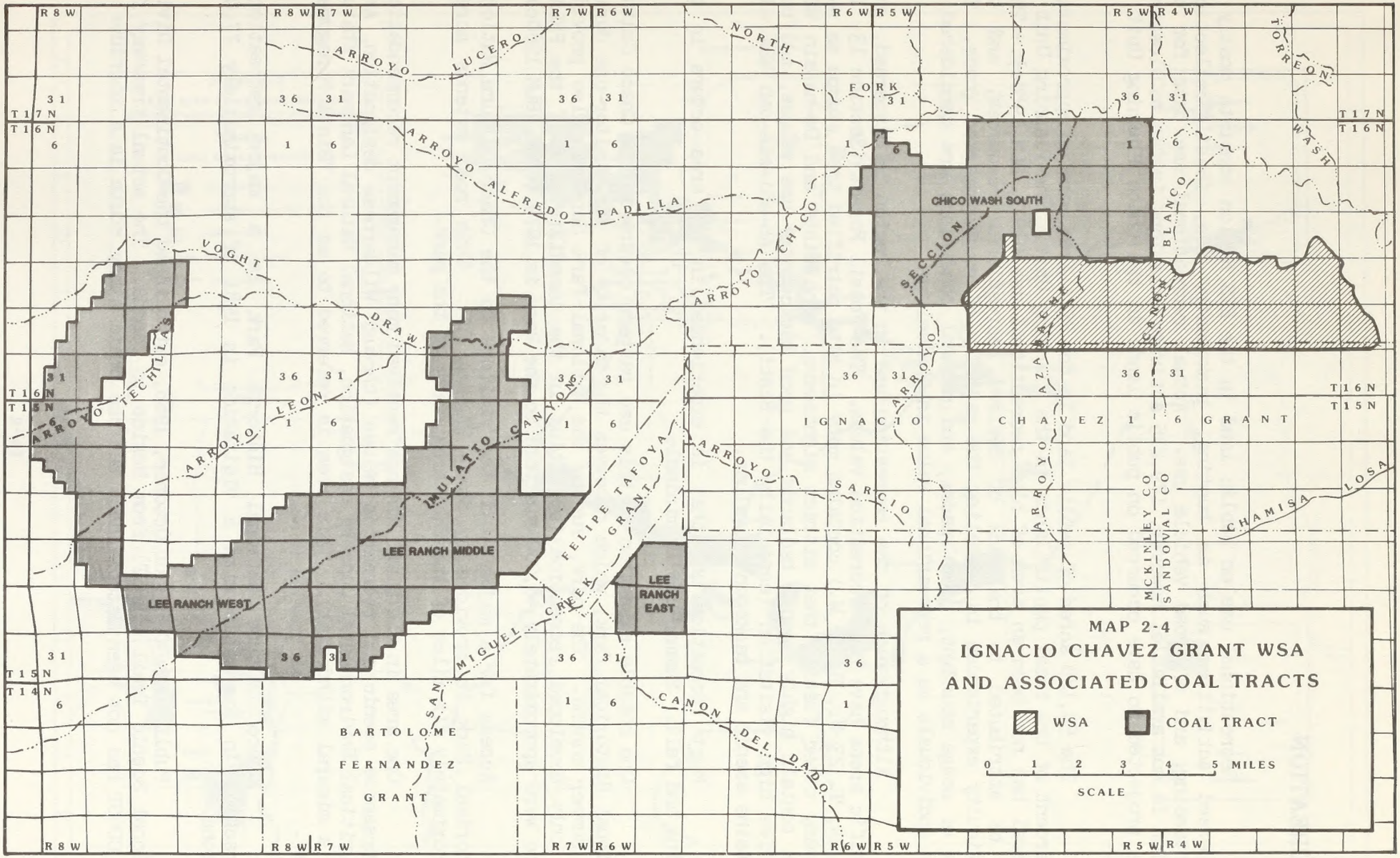
Recoverable surface and underground coal underlies the WSAs, ranging in depth from just under the surface to over 500 feet. A number of oil and gas-producing formations also underlie the general area of the WSAs, but at a greater depth than the coal beds. Scattered uranium deposits have been found underlying the WSAs.

Non-mineral activities in the area include dispersed recreation (sightseeing, collecting, hiking, and photography), livestock grazing, and use by local Navajo Indians for religious and ceremonial purposes. Archeological sites have been found, and Navajo gravesites are also believed to exist in the WSAs.

The sandstone and shale-derived soils of the WSAs support little vegetation except for some sagebrush, pinyon-juniper, and grass. These vegetational habitats provide a niche for such wildlife species as coyotes, jackrabbits, cottontail rabbits, deer mice, scaled quail, mourning dove, some passerine songbirds, snakes, and lizards. All three WSAs provide nesting habitat for raptor species of high interest, including ferruginous hawks, golden eagles, and prairie falcons. The Bisti, De-na-zin, Ah-shi-sle-pah Proposed Wilderness Areas Draft EIS (USDI, BLM 1982b) contains detailed information about these three WSAs.

The Ignacio Chavez WSA which originally consisted of 32,248 acres was under review, as well as an Environmental Assessment containing a detailed analysis of the area. These were scheduled to be released in March 1983. Because of a Department of the Interior policy change concerning split estate acreage in WSAs, the area under consideration for possible wilderness designation has now been reduced to 9,961 acres and will require additional time for study and analysis. Much of this area is the result of extensive lava flows and is located on the edge of a large mesa overlooking a scenic vista to the north and to the west. More detailed information about this area is available in the Albuquerque District Intensive Wilderness Inventory of April 1980.


R 14 W
R 13 W
R 12 W
R 11 W
T 24 N
T 23 N
T 22 N
BISTI #2
BISTI #1
BISTI #4
BISTI #6
HUNTER WASH
ALAMO WASH
COAL CREEK
TSAYA CANYON
DE NA ZIN
NAVAJO INDIAN RESERVATION
36
31
1
6
MAP 2-3
BISTI WSA AND ASSOCIATED COAL TRACTS
WSA
COAL TRACT
0 1 2 MILES
SCALE



MAP 2-4

IGNACIO CHAVEZ GRANT WSA AND ASSOCIATED COAL TRACTS

WSA

COAL TRACT

0 1 2 3 4 5 MILES

SCALE

RECREATION

Recreational use on public land in the EIS Region consists mostly of dispersed activities such as hunting, backcountry use, fossil collecting, sightseeing, and off-road vehicle use. Actual recreational use data for the region is not available; however, 179,235 activity occasions (refer to Glossary) were projected to have occurred on public lands in the Chaco Planning Unit in 1980.

The 50,188 acres of public land in the PRLA Area make up approximately 9 percent of the total public lands in the Planning Unit. The Planning Unit in general has not been an area of high recreational use (USDI, BLM 1980c). This can be attributed to the lack of desired recreational resources, and the difficulty experienced in traveling the majority of rough unmarked roads. The lack of usage abundant, open spaces, and natural conditions are considered by some individuals as a recreational value in themselves.

Although much of the recreation use in the region is dispersed, some specific areas have high recreation values. The Fossil Forest (Section 13, 14, 23, 24, T. 23 N., R. 12 W.) contains many in situ petrified tree stumps as well as many other fossils that attract sightseers. The Bisti and De-na-zin WSAs both contain highly scenic badlands and good backcountry use values, and both receive high visitation (especially the Bisti). The Ah-shi-sle-pah WSA also contains scenic and backcountry values.

Most recreation use that is experienced in the area occurs in the spring and fall. Summer use is minimal.

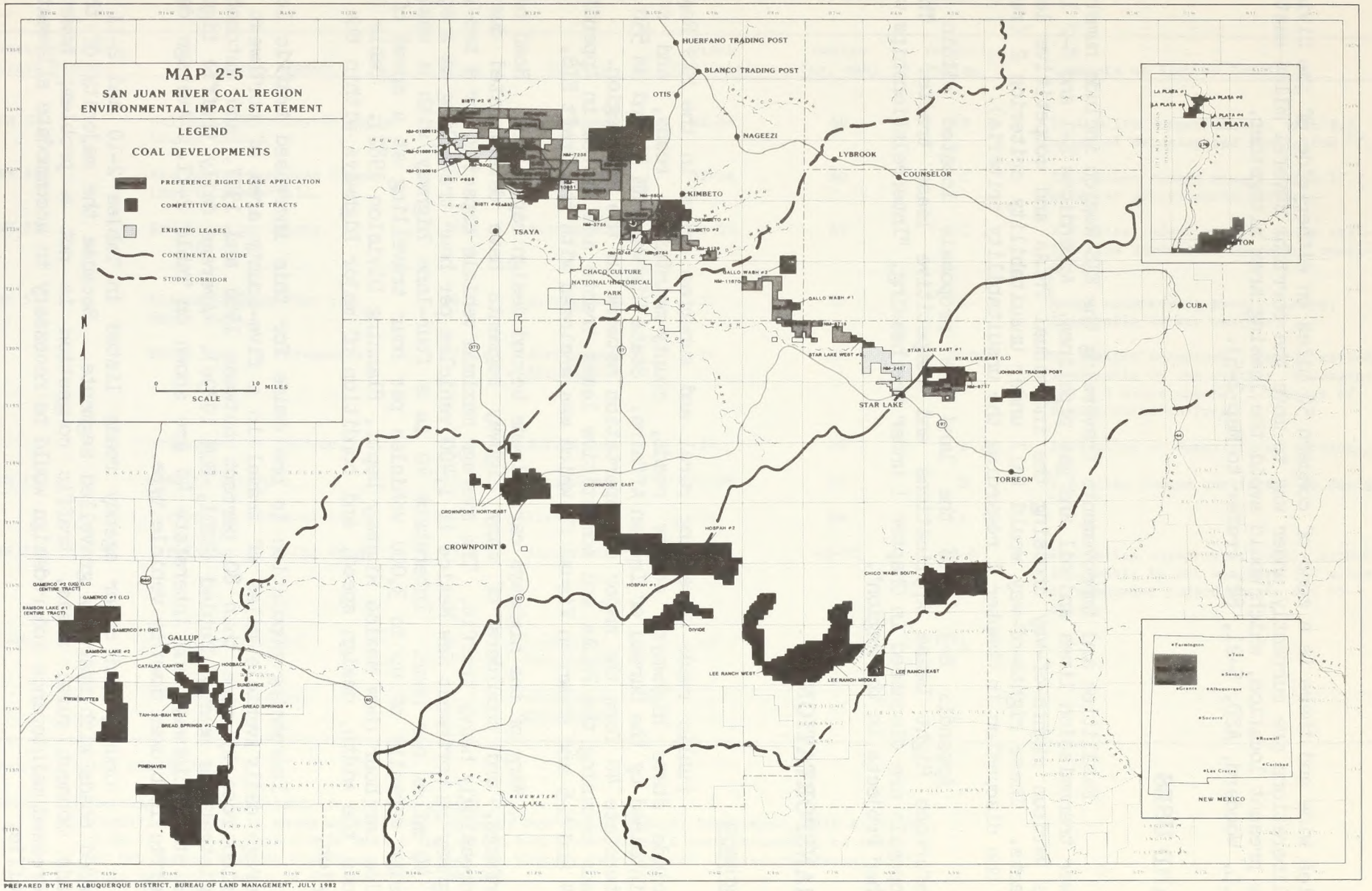
One notable exception to this use pattern occurs in the Chaco Culture National Historical Park, which receives the majority of its visitor-use during the summer months. The park, run by the National Park Service, also provides the only developed recreation facilities in the immediate area of the PRLAs. There were approximately 48,000 visitors to the Park in 1979 (USDI, BLM 1980c).

Access for a majority of the visitors to the Chaco Culture National Historical Park is provided by State Highway 57. This road extends across approximately six miles of the PRLA Area north of the park.

One area in the Bisti WSA has received many management recommendations to preserve scenic and recreation values (through Wilderness designation, Area of Critical Environmental Concern designation, National Natural Landmark status, and a mineral withdrawal). This area is referred to as the "Bisti Management Area".

Chaco Culture National Historic Park is a major recreational attraction in the basin with a visitation in 1981 of approximatlely 77,000 persons.

Public Law 90-543 of October, 1968, established the Continental Divide National Scenic Trail (CDNST) from Mexico to Canada. The actual treadway for the CDNST has not been established, but the basic study route is a corridor 30



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miles wide and there is a zone of concern 50 miles on either side of the Divide. Deliberations are currently under way to move the corridor several miles east of the present location, which would avoid the leasing area altogether. (L.L. Woodard, ASD, 5-21, 82) (refer to Map 2-5).

LAND USES

Facilities and improvements traversing the EIS Region include numerous power transmission lines and oil and gas pipelines. Appendices E-1 and E-2 list the various rights-of-way crossing the individual PRLAs and competitive lease tracts. These rights-of-way would fall under unsuitability criterion 2 (refer to the discussion in Chapter 1 regarding the unsuitability criteria).

Appendix E-3 lists the land use proposals located within the Preference Right Lease Applications and competitive lease tracts. These proposals are discussed in Chapter 1 under the heading, "Interrelationships with Other Projects in the Region".

TRANSPORTATION

Highways

Public roads accessing rural and suburban areas in the EIS Region include state highways, county roads, county-maintained roads, and roads maintained by the Bureau of Indian Affairs. State Highways NM 44 and NM 550 and Interstate 40 form the major transportation network in the EIS Region. The roads crossing the PRLAs and competitive lease tracts are listed in Appendices E-4 and E-5 and shown on Visual C, which was enclosed with the Draft EIS.

Many of the highways carry loads beyond design capacities. Road beds, surfaces, and shoulders of many highway segments have deteriorated due to increasingly heavy traffic. The average maximum vehicle capacity for a two-lane highway in northwest New Mexico is 1,400 vehicles per hour travelling at a speed of 40 miles per hour. Interstate 40 is a four-lane highway with a maximum design capacity of up to 3,000 vehicles per hour travelling at a speed of 50 miles per hour (New Mexico Highway Dept., Planning Division 1982). Table 2-10 shows the width, design speed, and condition of major highways within the EIS Region.

Increasing population is one cause for this increased traffic load. Average daily vehicle miles of travel in a five-county area of northwest New Mexico rose by more than 80 percent between 1966 and 1977, and automobile registrations nearly doubled (USDI, BLM 1979c). Average daily traffic figures for state highways and Interstate 40 are shown on Table 2-11. Average daily traffic is broken down by vehicle type.

County and other agency roads listed in Tables 2-10 and 2-11 are bladed roads with sparsely gravelled segments. Because the majority of these roads connect rural areas, traffic congestion is not a problem; however, increased maintenance and redesign would be necessary to accommodate all-weather traffic.

TABLE 2-10

HIGHWAY USE AND CONDITIONS IN THE EIS REGION BY HIGHWAY SEGMENT [a/]

Interstate or State Highway	Highway Segment	Miles	Surface	Width (in feet)	Design (sp. mph)	Condition Rating [b/]	Comments on Flow or Condition
NM 32	Gallup to McKinley-Valencia County Line.	41.5	Bituminous	22-44	60	B	13.0 miles judged unsafe, with 9.6 miles of deteriorated foundation [c/].
NM 44	Rio Arriba-San Juan County Line to Bloomfield.	43.7	Bituminous	22-36	60	C	27.4 miles judged unsafe, with 17.7 miles of deteriorated surface.
NM 53	San Mateo to Grants.	20.3	Bituminous	22-50	60	C	2.3 miles judged unsafe, heavy traffic flow diminishes operating conditions.
NM 57	Blanco Trading Post to White Rock.	39.7	dirt/gravel	20	40	D	Route unimproved; poorly marked, impassable in wet weather.
	White Rock to Crownpoint	27.0	dirt/gravel Bituminous	24	40	B-D	20.3 miles unimproved, poorly marked, impassable in wet weather of remaining 2.8 miles unsafe, 3.9 miles of deteriorated surface.
	Crownpoint to Thoreau.	21.2	Bituminous	24	60	B	16.9 miles of deteriorated surface.
NM 197	Cuba to Torreon.	25.6	Bituminous	22-28	60	B	4.8 miles judged unsafe due to design.
	Torreon to Crownpoint.	60.0	Bituminous	25	60	A	
NM 371	Farmington to White Rock	57.9	Bituminous	30	40-50	B-D	41.5 miles unimproved, poorly marked impassable in wet weather, 5.0 miles of remainder judged unsafe due to design.
I-40	Grants to Thoreau.	24.8	concrete/ Bituminous	40	70	A	
	Thoreau to Gallup.	27.3	concrete/ Bituminous				

Source: USDI, BLM 1979c.

Notes: [a/] Information not available for NM 170 and NM 509.
[b/] Condition rating is based on Adjusted Rating of New Mexico Highway Department, With A-75-100, B-50-74, C-25-49, and D-0-24 with A indicating best conditions, D worst, according to terms of New Mexico Highway Department. Ratings for Highway Improvement: Procedures Manual, 1971.
[c/] This segment resurfaced and upgraded, 1980-81.

TABLE 2-11

1980 AVERAGE DAILY TRAFFIC AT CONTROL STATIONS (BY VEHICLE TYPE)

Interstate Or State Highway	Highway Segment	Passenger Cars	Single Unit Trucks	Buses	Truck-Tractor Combinations	Misc. Vehicles	Totals
NM 57	12.3 miles N. of R/R crossing in Thoreau	722	1,136	19	113	21	2,191
NM 32	N. of Jct. NM 36, S. of Gallup	713	760	5	42	21	1,541
NM 44	1.5 miles S. of Bloomfield	1,919	2,565	49	468	154	5,155
I-40	5.4 miles W. of Milan	4,477	2,086	50	1,848	549	9,010
NM 53/334	1.5 miles NE of Jct. 66 at Milan	1,804	1,867	7	190	55	3,923
NM 170	N. of Jct. US 550, W. of Farmington	1,687	1,740	13	54	85	3,579

Source: New Mexico State Highway Department 1980.

Note: Figures not available for NM 197, NM 371 and NM 509.

The transportation plans of local and regional governments focus on the need for increased maintenance and improvement of roadways. New Mexico 371 is presently being redesigned and paved to accommodate existing traffic. All except a 20-mile segment between the Bisti Badlands and Crownpoint, New Mexico has been completed. Trucks haul coal on NM 371 from the existing De-na-zin (state lease) Mine, approximately 35 miles south of Farmington, New Mexico, to the San Juan Powerplant located west of Farmington. Of this segment, only approximately 5 miles have not yet been completed.

Increasing traffic and exceeded vehicle design capacities on northern New Mexico Highways have resulted in higher accident numbers and rates. Table 2-12 shows the number of traffic accident rates by highway segment for 1980.

Rail Lines

Two proposed railroads and the existing Atchison-Topeka and Santa Fe (AT&SF) Railroad cross the EIS Region. The AT&SF runs east-west through Gallup, New Mexico, located in the southern portion of the region. An existing spur line of the AT&SF runs in close proximity to the Gamerco and Samson Lake Tracts, providing a mode of coal transport. The railroads proposed to cross the PRLAs and competitive lease tracts are listed in Appendices E-4 and E-5.

The proposed route of the Star Lake Railroad runs within approximately 2 to 10 miles of all but two of the PRLAs. Coal-hauling trucks would use newly constructed coal-hauling roads or reconstructed, existing bladed roads to access loadout facilities on the Star Lake Railroad. The potential also exists for the construction of rail spurs or conveyor belts to transport coal from proposed competitive lease tracts or PRLA's. As with roads these facilities would be constructed in order to access loadout facilities.

SOCIAL AND ECONOMIC FACTORS

The EIS Region is characterized by a tri-ethnic culture--American Indian, Hispanic, and Anglo (refer to Table 2-13). This mix of cultures results in regional cities and communities that differ greatly from each other and contain internal variations as well. Differences exist in social and community organization, lifestyles, religious values, and other ethnic and racial precepts.

Demography

The EIS Region's population is centered around less than a dozen cities or towns, and most of the rural area is sparsely settled. In 1980, the region's population density was 11.5 persons per square mile, compared to 10.7 for the State of New Mexico and 62.6 for the United States (see Navajo Chapter populations Table 2-18).

The region's population increased by more than 185 percent between 1950 and 1980, although some counties and cities showed population decreases in the 1960s. In 1950, the region was home for 11.8 percent of the state's population. By 1980, this percentage was 17.8, indicating more rapid growth in the region than in other areas of the state.

TABLE 2-12

TRAFFIC ACCIDENTS AND ACCIDENT RATES BY ROAD SEGMENT
1980

Interstate or State Highway	Segment	Number of Accidents	Accident Rate [a/]
NM 371	Jct. I-40 (Thoreau) Farmington	72	2.0
NM 57	Jct. 44 (Blanco T.P.) - 371	0	0
NM 32	Jct. US 60 (Quemado) - Gallup	47	1.4
NM 197	Jct. 44 (Cuba) - Torreon	17	3.8
NM 44	Jct. 25 (E of Bernalillo) - Jct. 55		
I-40	Jct. 57 (Thoreau) - Az. Line	243	Not avail.
	Entire New Mexico Segment	1566	0.7
NM 53/344	Milan - San Mateo	23	1.1
NM 509	Jct. 53/334 - Ambrosia Lake	5	0.5
NM 170	Farmington-Colorado State Line	20	2.1

Source: New Mexico State Highway Department 1980.

Note: [a/] Accident rate shown is per million vehicle mile.

TABLE 2-13

ETHNIC MIX OF COMMUNITIES AND COUNTIES OF THE EIS REGION (1980 Figures)

County Communities	American Indian [a]		White (Includes Hispanics)		White (Hispanics Only)		Black		Asian [b]		Other	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
McKinley County	36,155	65.8	14,071	25.6	7,500	13.6	313	.6	203	.4	4,208	7.7
Crownpoint Division	9,263	87.9	1,121	10.6	217	2.1	16	.2	4	.04	137	1.3
Gallup City	3,557	19.6	10,511	57.9	6,610	36.4	259	1.4	180	1.0	3,654	20.1
Sandoval County	9,499	27.3	20,521	59.1	9,580	27.5	300	.9	65	.2	4,414	12.7
Cuba Division	1,895	48.9	1,264	32.6	1,403	36.2	18	.5	3	.1	697	18.1
Cuba Village	53	8.7	327	53.7	429	70.4	-	-	1	.2	228	37.4
San Juan County	26,777	33.1	48,872	60.5	9,551	11.8	321	.4	153	.2	4,710	5.8
Aztec Division	567	5	9,955	87.7	1,698	15	21	.2	13	.1	794	7
Bloomfield Division	1,049	11.3	7,139	77.2	2,541	27.5	5	.1	6	.1	1,047	11.3
Farmington Division	3,774	10	30,905	81.6	5,172	13.7	268	.7	119	.3	2,807	74
Farmington City	2,626	8.5	25,284	82.3	4,429	14.4	245	.8	104	.3	2,470	8.0
Valencia County [c]	8,368	13.8	43,334	71.2	26,857	44.1	343	.6	140	.2	8,668	14.2
Grants Division	2,909	11.9	17,703	72.4	10,627	43.5	156	.6	59	.2	3,608	14.8
Grants City	215	1.9	9,322	81.4	5,908	51.6	72	.6	39	.3	1,803	15.7
Milan Village	151	4.0	3,034	81.0	1,770	47.2	70	1.9	10	.3	482	12.9

Source: U.S. Department of Commerce 1981.

Notes: [a] Also includes Eskimo and Aleut.
[b] Also includes Pacific Islander.
[c] Includes what is now Cibola County.

This overall rapid growth has resulted from energy-associated development. Population projections show the growth in the four counties included in the EIS Region continuing through the year 2000. Substantial population growth is projected even for some of the small communities within the region. This rapid growth contributed to each of the counties in the region being designated as energy-impacted counties under Section 601 of the Powerplant and Industrial Fuels Use Act of 1978.

Some counties and communities have specific growth problems that do not follow the regional pattern. For example, nearly all of McKinley and San Juan Counties have been influenced by energy-related activity in the region, while only Cuba in Sandoval County and the Grants-Milan area of Cibola (previously Valencia) County feel these direct influences.

The population of the village of Cuba in 1980 was 605 people, a growth of 47 percent since 1970. However, within the 3-mile planning perimeter, there were about 1,110 people (Middle Rio Grande Council of Governments, 1980). The Grants-Milan area of Valencia (now Cibola) County has a population of 15,198 in 1980, a growth of 38 percent since 1970. This area is made up of two separate cities adjoining one another. Each city struggled to meet the needs of the expanding population in the 1970s, but reduced demand in the uranium industry in the 1980s has cuased somewhat depressed economic conditions. Milan, the smaller of the two communities, had a 68 percent population increase in the 1970s, but is currently looking for some industry to replace the jobs lost in the uranium production slowdown.

Housing

The housing supply has nearly doubled in the last decade in the four-county area affected by mining in the EIS Region. The housing supply in San Juan and McKinley Counties from the 1980 census stood at 28,380 and 17,059 respectively. Woodward-Clyde Associates, Inc. estimated that, in 1981, 46 percent of this supply was in areas most likely to be affected by coal mining. In 1980, Valencia and Sandoval Counties had housing supplies of 21,862 and 11,898 respectively (refer to Table 2-14).

The type of housing has changed notably during this ten-year period. The proportion of mobile homes in the four-county area was 9.5 percent of all homes in 1970, and 18.6 percent in 1981. The percent increase annually by county for mobile homes was: McKinley County, 15.5 percent; Sandoval County, 37.9 percent; San Juan County, 29.1 percent; and Valencia County, 26.9 percent. Multi-family home numbers also increased, going from 9.2 percent of all homes in 1970 to 12.3 percent in 1981 in the four counties. Single-family homes decreased from 80.3 percent of all homes to 66.7 percent (four-county total) during this same period.

The housing vacancy rates for the EIS Region are listed in Table 2-15. It is estimated that 6,000 of these homes (17 percent) are in the area likely to be affected by coal leasing.

Water Supply

Data available indicates that most communities have water rights adequate for their present needs. Notable exceptions to this appear to be the

TABLE 2-14

HOUSING SUPPLY SUMMARY
NUMBER OF HOMES BY TYPE
(1970 - 1980)

	McKinley		Sandoval		San Juan		Valencia		Four-County Area	
	1970	1980	1970	1980	1970	1980	1970	1980	1970	1980
Total Yearround Housing Units	10,506	17,059	4,602	11,898	14,746	28,380	11,363	21,862	41,217	79,199
Single Family Units	8,302	11,430	4,205	9,751	11,513	17,292	9,341	14,167	33,361	52,604
Multiple Family Units	1,428	2,930	158	948	1,636	4,095	634	2,200	3,856	10,173
Mobile Family Units	776	2,699	239	1,235	1,597	6,993	1,388	5,495	4,000	16,422

Source: University of New Mexico, Bureau of Business and Economic Research, 1982, and New Mexico State Automatic Data Processing Department, 1982

TABLE 2-15
HOUSING VACANCY RATES FOR THE EIS REGION a/

County	Total Number of Units	Number Vacancy	Percent
McKinley	18,128	1,981	10.9
Sandoval	12,286	1,434	11.7
San Juan	29,730	3,360	11.3
Cibola b/	3,977	456	8.7

Source: University of New Mexico, Bureau of Business and Economic Research, 1982.
Notes: a/ These are 1980 figures. The numbers are probably higher now due to the slump in oil and gas and uranium activity.
b/ These figures are for the city of Grants only.

cities of Aztec and Bloomfield, where annual rights are shown as 1,178 and 400 acre-feet, respectively, and use is shown at 1,188 and 1,100 acre-feet, respectively (refer to Tables 2-16 and 2-17). While the figures for Gallup do not show any shortage in water rights, Gallup has had concerns over an adequate water supply for its projected growth and has gone to great expense to find adequate water for its needs. Several community and individual water systems exist throughout the EIS Region.

Wastewater Systems

Figures available indicate that Farmington, Aztec, and Crownpoint are each operating their wastewater treatment facilities at capacity. Figures for other communities show use capacity ranging from 33 to 60 percent. In addition to unused capacity, plant modification could add capacity to the Farmington and Aztec systems. Farmington has also indicated a need for sewerline replacement.

In rural areas, many homes are served by individual septic systems.

AMERICAN INDIAN CONCERNS

Indian Tribes in the EIS Region

The EIS Region is located within the State of New Mexico's newly created 3rd Congressional District. This district contains nearly all of the state's 110,000 American Indians, including 41 chapters of the Navajo Nation, the Jicarilla Apache Reservation, and 19 pueblos (Steinberg, 1982). Approximately one-half the population of the state's San Juan and McKinley Counties, where the competitive coal lease tracts are located, is made up of American Indians, principally Navajo (Woodward-Clyde, 1982).

The Zuni Reservation and the Ute Mountain Reservation are adjacent to competitive coal lease tracts on the extreme northern and southern portions of the EIS Region. The BLM has made initial contact to notify these tribes of potential leasing in the area. The Apache Tribe lies to the east of the San Juan Basin Coal Region.

The Jicarilla Apache Tribe

The Jicarilla Apache Reservation encompasses 750,000 acres in north central New Mexico, which lies to the east and is adjacent to the San Juan Coal Region. The tribe has an estimated 1983 population of 2,300. Neither the PRLAs nor the competitive tracts lie within the reservation boundary.

Their principal source of income comes from oil and gas royalties, agriculture, ranching, recreation, crafts and local business. They have plans for an extensive 20 to 30 thousand acre irrigation project towards the southern end of the reservation as well as the many small tracts of farm lands. Large amounts of water are required for farming and ranching operations as well as for oil and gas recover. Becasuse of these type of operations water has become a very ctitical factor in maintaining the economic stability of the tribe.

TABLE 2-16

COMMUNITY WATER SYSTEMS

	Farmington	Aztec	Bloomfield
Source	Animas and San Juan Rivers	Animas River	San Juan River
Annual Rights (acre-feet)	18,103	1,178	400
Treatment Capacity			
Annual (acre-feet/yr.)	44,809	1,608	1,680
Daily (Gallons/day)	40,000,000	1,500,000	1,500,000
Storage Capacity			
Raw (acre-feet/yr.)	7,620	31	80
Treated (Gallons/day)	16,500,000	3,250,000	750,000
Use			
Annual Withdrawal (acre-feet/yr.)	14,179	1,188	1,100 a/
Peak Day (Gallons/day)	23,000,000	2,100,000 a/	2,000,000

Source: Woodward-Clyde Consultants, 1982; New Mexico State Engineers Office, 1982; New Mexico State Planning Division,1982; New Mexico State Economic Planning Division, 1982; and Cuba Engineers Office, 1982.

Note: a/ Estimated.

TABLE 2-17

COMMUNITY WATER SYSTEMS
(Wells)

Source	Gallup	Crownpoint	Thoreau	Grants-Milan	Cuba
Annual Rights (acre-feet)	847 Permitted 10,645 Declared	a/	200 Afy	2,990	Not allowed at present
Treatment Capacity					
Annual (acre-feet)	4,201	973	205	7,706	600
Daily (Gallons/day)	3,750,000	868,320	208,800	6,695,000	535,568
Sewage Capacity Type	Primary-secondary	4-Cell lagoons	Lagoon	Activated slush plant	2-Cell lagoons w/sand filter
Capacity (1980) (Gallons/day)	2,500,000	a/	a/	2,000,000	120,000
Use as a % of Capacity	44%	100%	33%	50%	60%
Use					
Annual Withdrawal (Acre-feet)	2,738	900	120	2,987	358
Peak Day (Gallons/day)	2,500,000	800,000 Est.	a/	4,800,000	a/

Source: Woodward-Clyde Consultants, 1982; New Mexico State Engineers Office, 1982; New Mexico State Planning Division, 1982; New Mexico State Economic Planning Division, 1982; and Cuba Engineers Office, 1982.

Note: a/ Figures not available.

The Navajo Tribe

All of the proposed EIS Region, with the exception of the four La Plata tracts north of Farmington, lies within the Eastern Navajo Agency. This agency is an off-reservation administrative unit of the Bureau of Indian Affairs (BIA)/Navajo Nation. The agency had an estimated 1980 Navajo population of 35,407 (USDI, BIA 1982). This population is subdivided among chapters and districts, the basic political units of Navajo Tribal Government.

Seventeen chapters within Districts 15, 16, and 19 are located within PRLAs or competitive lease tracts. The names of these chapters and their estimated 1980 Navajo population are shown in Table 2-18. Agency, district and chapter boundaries are shown on Visual D, which was enclosed in the Draft EIS.

Navajos Living on the PRLA Area

As shown in Appendix F-1, Navajos live on six of the PRLAs proposed for surface mining and one PRLA proposed for underground mining. Of the 18 residence groups living on the PRLAs, 7 are located on public lands, 1 is on a homestead, 7 are on Indian allotments, 1 is on surface withdrawn for Indian use under Public Land Order (P.L.O.) 2198, and 2 are on surface owned by the Navajo Tribe. (Refer to the Glossary for definitions of these forms of ownership.)

Surface ownership in the Eastern Navajo Agency is typically in a patchwork pattern. Families not authorized to live on public domain lands occur throughout the area administered by the Eastern Navajo Agency. In many cases, these are families who have been living in the same location for two to three generations or longer. Serious land management problems have developed as a result of the occupancies and the complex ownership pattern. The most recent effort to resolve some of the problems is a proposed land exchange between the U.S. Government and the Navajo Tribe (refer to the land use section of this chapter). Some unauthorized Navajo families located on the competitive lease tracts are included in this proposed exchange.

Seven Navajo residence groups not authorized by the BLM are living on public land. They are excluded from the above exchange because the PRLAs are pre-existing lease applications for federal coal.

The 39 households on the PRLAs represent separate nuclear families. Based on an average nuclear family size of 5.8 members (Arthur, 1978), these nuclear family households could include 226 individuals. Many Navajos feel strong emotional ties for a household associated with a residence group living in a particular geographic locale. It is known that adults working elsewhere regard the households/residence groups on the PRLAs as their real home and return as frequently as possible.

A total of 55 residences occur on the PRLAs. One-third of the households own two or more residences. This quantity of housing may reflect the fluctuating household requirements for sheltering returning family members. The variety of building styles appears to reflect specialized ceremonial requirements. One-third of all residence groups have at least one hogan, a building essential for the performance of curing ceremonies.

TABLE 2-18

POPULATION OF NAVAJO CHAPTERS
PRINCIPALLY AFFECTED BY PROPOSED LEASING
(1980 Population Estimates)

District Chapter		Estimated Population
District 15		
Becenti		615
Crownpoint		1,609
Lake Valley		648
Little Water		912
Pueblo Pintado		1,169
Torreon		1,668
Whitehorse Lake		968
White Rock		399
	SUBTOTAL	7,988
District 16		
Bread Springs		1,046
Chi-Chil-Tah		2,180
Church Rock		2,563
Red Rock		1,808
Tsayatoh		889
	SUBTOTAL	8,486
District 19		
Counselor		1,117
Huerfano		2,368
Nageezi		1,341
Ojo Encino		772
	SUBTOTAL	5,598
	TOTAL	22,072

Source: USDI, BIA 1982

Approximately 10 percent of the residences have piped water, but domestic water must be hauled to the remaining residences. Many families travel several miles to the nearest source of water, usually a BLM, BIA or Navajo Tribe well. Approximately 53 percent of the Navajos in the Shiprock Agency haul water (Arthur, 1978). This situation is also assumed to occur on the proposed competitive lease area outside the PRLAs.

Navajos Living on the Competitive Tracts

Families on the competitive coal lease tracts were inventoried by BLM personnel flying parallel transects by helicopter across each tract. A total of 345 residences were recorded on surface mineable tracts and 110 residences on underground mineable tracts. Surface ownership and legal descriptions of these residences are shown in Appendices F-2 and F-3. Visual D shows the number of residences per tract, along with the number of residences and households on the PRLAs. It is assumed that clusters of residences on the tracts probably reflect residence groups, but this has not been confirmed by field interviews. (As is evident from the discussion of families on the PRLAs, the number of residences does not necessarily represent an accurate measure of the number of households that may be present.)

Social and Economic Patterns

It is estimated by BLM personnel that approximately 65 percent of fulltime Navajo residents on the PRLAs and competitive lease tracts are non-English speaking. While there is known to be considerable variation in social and economic behaviors from one family to another, traditional social and economic patterns generally remain strong among rural Navajos throughout the area surrounding the EIS Region. The following discussion relates to social and economic patterns known to prevail on the PRLAs and believed to be typical of all or the majority on the competitive coal lease tracts.

Livestock grazing is the principal economic activity on the PRLAs. It is estimated by the BLM to account for approximately 30 percent of the average income. Ninety-four percent of the residence groups have access to one or more grazing permit(s). As shown in Appendix F-1, corrals, barns and other livestock facilities are shared by the households within residence groups. It is projected that extensive pooling of labor, money, and personally owned property such as vehicles also occurs between full-time and part-time residents.

Livestock grazing in the Eastern Navajo Agency is administered under a 1968 Cooperative Agreement between the Navajo Tribe, the BIA, and the BLM. Under the terms of the 1978 revision to this agreement, the majority of the grazing on the competitive coal lease tracts is administered by the BIA-Navajo Tribe. Seventy-seven percent of the livestock permits held by occupants on the PRLAs are BIA-Tribal permits.

Grazing permits are valued property and permits relinquished through death are transferred within families whenever possible. Demand for grazing use areas exceeds the available permits. Conflicts over grazing boundaries between use areas are common.

The Navajo Tribe has selected 35,000 acres of public land in New Mexico under the provisions of the Navajo and Hopi Settlement Act (P.L. 93-531,

as amended by P.L. 96-305, (Refer to Chapter 1, the section entitled "Interrelationships With Other Projects in the Region"). The Department of the Interior has this selection under active consideration but has not decided to approve it. Because of the interest shown in lands in the Bisti/De-na-zin area, it is anticipated that an unknown number of Navajo families from the former Navajo-Hopi Joint Use Area in Arizona will be resettled on lands selected by the Navajo Tribe on or around the competitive coal lease tracts. This will not create any additional conflicts with Navajos in the area since the selection has been made within the Paragon Resource Allotment, a private non-Navajo allotment.

The location of water is a critical factor in the management of livestock operations within use areas. The number of natural springs is limited. Deep wells provide the major source of livestock water, with some seasonal water available from earthen tanks and shallow wells dug into washes. When water is available, livestock operators with sufficiently large use areas rotate their stock among seasonal pastures. Some livestock operators make use of seasonal residences in conjunction with range rotation, still another factor accounting for the number of residences per household.

Sheep and goats are a traditional source of cash income, and these animals remain important in the economics of some families.

Rug weaving is also an important source of supplemental income for some families in the EIS Region. Handcrafts are particularly important during periods of economic adversity such as the present, when Navajo unemployment has reached a reported rate of more than 75 percent (Albuquerque Journal, 1982). While the income realized per hour of labor is notably low for weavers, supplies of locally produced wool are available at a nominal cost. A variety of minerals and plants are gathered by weavers, including gypsum (used to remove grease from white wool), yucca (used as a cleaning agent), and such plants as snakeweed, serviceberry and Mormon tea (used as natural dyes).

Gravesites

Archaeological evidence indicates that the Navajos have been living continuously in the EIS Region for the past two to three centuries. The earliest presently known Navajo site on a competitive lease tract has been dated to the Developmental Herding Period (A.D. 1696-1800). The majority of Navajo occupation sites in the region date from the Post-Bosque Redondo Period (A.D. 1868), with the greatest amount of settlement occurring in the present century. Due to the length of time the Navajo have occupied the EIS Region, substantial numbers of gravesites may be present (refer to USDI, BLM, 1981a and 1981b for a discussion of Navajo burial practices).

Some gravesite locations have been identified to the BLM. As shown in Appendix F-4, 6 graves have been identified on surface mineable PRLAs, 5 graves on underground mineable PRLAs, and 25 to 35 graves on surface mineable competitive lease tracts. The locations and numbers of these graves have not been confirmed by the BLM. The precise location of Navajo graves is often difficult to determine, but the general locations of most burials from the past one to three generations could probably be identified through systematic personal interviews supplemented by visible archaeological evidence.

Sacred Sites

According to data collected by the Shiprock Research Center in 1975, 47 percent of Navajos report a religious affiliation with the traditional Navajo religion. Others are affiliated with the American Indian Church (Woodward-Clyde, 1982). Plants and minerals gathered from prescribed locations are essential to the ceremonial practices of both these groups. No systematic effort has been made by the BLM to identify all gathering areas in the EIS Region, but two gathering areas have been identified on surface mineable competitive coal lease tracts (refer to Appendix F-5).

Four offering points have been identified on surface mineable PRLAs, one possible offering point associated with water on a surface mineable competitive lease tract, and a sacred site of unknown type on an underground mineable competitive lease tract.

Additional sites of various types may exist. Several medicine men have informed the BLM that they consider the entire area between the four sacred mountains of the Navajo to be holy land. People are reluctant to discuss gravesites and sacred areas. As a result, it is difficult to collect accurate information about these subjects.

CHAPTER 3
ENVIRONMENTAL CONSEQUENCES

CHAPTER 3

ENVIRONMENTAL CONSEQUENCES

CHAPTER 3

ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter addresses the impacts that would result from coal mining on 39 competitively leased tracts and 26 PRLAs in the New Mexico portion of the San Juan River Coal Region. These tracts have been grouped into four production tonnage levels, from competitive tracts (128.5 million, 916.0 million, 1.32 billion, and 1.94 billion) and from PRLAs (1.4 billion tons) in order to facilitate impact analysis. Each tonnage level is associated with one of the alternatives described in Chapter 1.

This impact analysis deals primarily with the cumulative significant impacts resulting from the construction of facilities and the mining of federal coal. Site specific impacts by PRLA and competitive coal lease tracts have been considered and are presented in Appendices A-1, A-6, B-1-9, and F-1-5. (Lease terms and maps displaying special resource concerns by PRLA tracts are available for public review in the Albuquerque District and Farmington Resource Area offices. Other site specific impacts, visuals, and maps on the PRLAs are located through out the Draft and Final PRLA EA.) The site-specific impacts resulting from specific actions presented in mine plans developed for any leases that might be issued will be analyzed in more detail in environmental documents prepared by the Mining and Minerals Division, New Mexico Energy and Minerals Department and the Office of Surface Mining (OSM) when each mine plan is submitted.

ANALYSIS FRAMEWORK

GENERAL

The discussion is a worst-case analysis for each alternative. On some tracts, the amount of federal coal reserves is nearly negligible, and these tracts will likely be mined for their private reserves even if the federal reserves are not leased. Although this EIS analyzes the impacts of mining these entire tracts, though most of their reserves are non-federal, the non-federal coal will not be included in any coal lease sales.

It is possible, though unlikely, that impacts discussed in this chapter may begin to occur earlier than indicated in the analysis. Impacts beyond the year 2000 are too speculative to analyze.

Coal mining unsuitability criteria have been applied as required by 43 CFR 3461. Refer to Table 1-5 for a listing of those lands that have been dropped from further consideration because of the application of the unsuitability criteria.

Under Preference Right Lease Issuance impact analysis is summarized from the impact analysis found in the Final Environmental Assessment for Coal Preference Right Leasing, New Mexico (the "PRLA-EA"; USDI, BLM 1981b). Additional impact analysis was provided for air quality, land uses and American Indian Concerns because these disciplines were not covered in the above document.

Chapter sections discussing mitigating measures, unavoidable adverse impacts, short-term use versus long-term productivity (except for non-renewable resource components), and irreversible and irretrievable commitments of resources are located after the analysis of the impacts under the High Alternative.

ASSUMPTIONS

The assumptions used for impact analysis in this EIS for Preference Right Lease Issuance and the competitive lease alternatives are enumerated by resource component below.

GENERAL

1. The Star Lake Railroad, including spurs and loops, would be available to transport the coal by 1987.

2. Power would be delivered by the Fruitland Coal Load Transmission Line.

3. There would be zero discharge from point sources to waterways at support facility sites.

4. Haul roads, utility easements, and other associated facilities would undergo impact analysis as rights-of-way applications are received. It would not be until applications were submitted that the specific locations, alignment and other right-of-way information would be developed by applicants meeting the final showing requirements for PRLA.

5. Production would begin within 10 years of the issuance of a lease and would meet statutory and regulatory minimums.

6. Post-mining land uses would, in general, include the present land uses of livestock grazing, wildlife habitat, and recreation.

7. The federal coal under the PRLAs is combined into logical mining units with state and private coal.

8. For the purposes of a maximum coal analysis it is assumed that markets will be available in and outside the San Juan River Coal region. Thus all tracts would be leased and developed. However, the probability of this occuring is low.

9. For the majority of the tracts, start-up of construction and production on the competitive lease tracts will occur in 1986 and 1987 respectively.

Approximately 50 percent of the 39 tracts would start production and mine a total of 8.09 million tons in 1987. Peak production will occur in the year 2000.

Significant impacts will begin with actual production. Assuming that leases for the tracts discussed under the various alternatives are issued in 1984, production will begin no later than 1994 as required by the Mineral Leasing Act.

10. In general coal recovery tonnages are based on a 50 percent rate for underground mines and an 85 percent rate for surface mines. Exact rates are difficult to assess because of numerous variables that affect recovery rates.

11. Leasing/production from one tract or cluster of tracts, i.e. Gallup tracts or La Plata tracts, will have no effect on impacts from another tract; impacts will not exacerbate each other.

12. The predicted archeology site figures have been made assuming that the sites are evenly distributed across each tract.

13. All mining would be done in accordance with all statutory and regulatory minimums, including the requirements in the standard coal lease form as modified to include stipulations necessary to ensure compliance with the Bureau's review of the lands for unsuitability for surface coal mining under 43 CFR 3461.1. All required mitigation and lease terms have a high probability of being effective in achieving the intended regulatory goal.

14. All active mines would be inspected by OSM and the State of New Mexico for compliance with these requirements. Inspections would be required on an average of once a month.

AIR QUALITY

The background air quality value for the EIS Region is assumed to be 30 micrograms per cubic meter (ug/m^3) as recorded at Zuni, New Mexico. The existing mines and facilities are assumed to be part of the present background and are not analyzed separately.

TOPOGRAPHY AND MINERAL RESOURCES

Competitive coal lease tracts in the Bypass Alternative will be developed in conjunction with adjacent existing leases or PRLAs.

VEGETATION/LIVESTOCK GRAZING

Mined lands will not generally be available for grazing during the entire life of a mine, even though the tract has been revegetated. However, the potential does exist for limited grazing once reclamation has been satisfactorily completed for a portion of the permit area to the standards of the regulatory authority for bond release.

WILDERNESS

Coal lease NM-0186613 and the northern portion of lease NM-0186612 will be exchanged for comparable leases in the Bisti #1 Tract (refer to the Draft Bisti Coal Lease Exchange Environmental Assessment (USDI, BLM 1982c).

RECREATION

The entire area of surface disturbed by each mine will be closed to public use for the life of the mine.

TRANSPORTATION

1. State highways will be utilized by commuting workers in car pools, rather than the less direct routes of unimproved county and other agency-maintained roads at a rate of two persons per vehicle.

SOCIAL AND ECONOMIC FACTORS

1. Increases under 10 percent are not significant and are not included in the EIS.

2. Net taxable values are $2.5 million dollars per million tons of annual production for surface mining, and $8.33 million dollars per million tons of annual production for underground mining.

3. Severance tax (including surtax) is $.73 per ton.

4. Tax rates are in dollars per $1,000 of net taxable value as used in the 1980-81 tax year.

5. For underground and surface mines respectively, 30 and 50 percent of the newly hired work force would be local hires, and 70 and 50 percent would be immigrants to the region.

INTRODUCTION TO THE ALTERNATIVES

The first section, No Action Alternative, is the No Action Alternative for the PRLA processing. The No Action Alternative plus the 26 Preference Right Lease Issuance forms the basis for the "No Action Alternative" for the competitive coal leasing. In each section the discussion first analysis the impacts of an alternative and then the cumulative impacts of mining under that particular No Action Alternative or action.

The cumulative impacts of coal and non-coal projects are summarized at the end of Chapter 3.

EXISTING COAL LEASES

IMPACTS-NO ACTION ALTERNATIVE

This alternative proposes no new leasing of federal coal. Coal production would result from the development of coal from existing and proposed coal mines under contract commitments or mine plans. In-place coal reserves are approximately 800 million tons, with 600 million tons being recoverable. Projected coal production in 1987 and the year 2000 would be approximately 39.4 and 16.5 million tons, respectively.

AIR QUALITY

Expected development of the coal would result in an increase in particulates in the vicinity of the mines. The increase in other pollutants (sulfur dioxide, nitric oxides, carbon monoxide, hydro-carbons, ozone, and lead) resulting from the mining operations would be immeasurable on a regional scale and insignificant.

Dispersion modeling was conducted for the various alternative levels of coal mining. The values obtained by this modeling were then added to the assumed background level of 30 ug/m^3. These values were then compared with the annual NAAQS and the New Mexico standards.

The increase in the annual average ambient TSP concentrations due to expected development is estimated to be 5 ug/m^3. Table 3-1 shows that when added to the background this would give estimated values of <100 ug/m^3. This value is below the applicable standards.

The greatest contribution to the predicted concentrations would be vehicular travel on unpaved roads. This includes truck haulage of coal, employee traffic, and general use of unpaved roads by the increased population of the northwestern New Mexico region.

Most of the particles that contribute to the increased concentration of TSP are large and would settle out within approximately one mile of the source. Terrain provides a barrier to particulate movement and causes variation in wind flow, which would tend to disperse these pollutants.

Table 3-1a shows that annual visual range reductions can be expected to be decreased by less than 8 percent from the base visual range of 73 miles. Short-term (24-hour) concentration would result in less than a 50 percent decrease in visual range.

The impact to visual range from increased population in cities and towns would be greater than the impact from coal production activities as TSP emmissions from cities have more small particles than mining caused emmissions. Small particles are more effective than large particles in scattering light and thus are more effective in reducing visual range.

Based on the use of the NAAQS and Prevention of Significant Deterioration (PSD) standards as a measure of significance, the calculated increased TSP concentrations from this alternative would not result in a significant air quality impact.

TABLE 3-1

TOTAL SUSPENDED PARTICULATES (TSP) EXCEEDED BY ALTERNATIVE

Alternative	Total TSP [a]	TSP Exceeded [b]
No Action (Base 80 ug/m^3)	<100 ug/m^3	-------
Preference Right Lease Issuance	100 ug/m^3	-------
Bypass [a]	163 ug/m^3	13 ug/m^3
Minimum Surface Owner Conflicts [a]	234 ug/m^3	84 ug/m^3
Target [a]	234 ug/m^3	84 ug/m^3
High [a]	236 ug/m^3	86 ug/m^3

Note: [a] Total includes that for the No Action Alternative and PRLA.
[b] New Mexico State 24-hour standard for TSP is 150 ug/m^3.

TABLE 3-1a

ANNUAL AVERAGE VISUAL RANGE REDUCTIONS BY ALTERNATIVE

Alternative	Visual Reductions [a] (Miles)	Cumulative Visual Reductions (Miles)	Visual [a] Reductions (1%)	Cumulative Visual Reduction (%)
No Action (Base 73 Miles)	[b]	<67	[b]	<8
Preference Right Least Issuance	6 [c]	67	8 [c]	8
Bypass	2	65	3	11
Minimum Surface Owner Conflict	7	60	10	18
Target	7	60	10	18
High	7	60	10	18

[a] Impacts are attributable soley to this particular alternative or action.
[b] Data not available.
[c] This figure includes the No Action Alternative.

TABLE 3-2

TOTAL ACRES DISTURBED BY ALTERNATIVE

Alternative	Surface Disturbed (Acres) 1987	2000	Total	Surface Facilities (Acres)	Total Surface Acres
No Action[a/]	8,000	16,000	24,000	1,000	25,000
Preference Right Lease Issuance[a/]	1,500	10,000	21,315	705	22,020
Bypass [a/]	364	1,342	5,530	600	6,130
Minimum Surface Owner Conflicts [a/]	308	4,988	18,252	1,050	19,302
Target [a/]	859	10,593	33,877	2,100	35,977
High [a/]	1,771	23,641	65,141	3,500	68,641

Note: [a/] Impacts are attributable solely to this particular alternative or action.

TOPOGRAPHY AND MINERAL RESOURCES

Mine-site preparation would involve alteration of the natural topography. However, the mining phase of the operation would have a much greater impact on topography, because the overlying strata would be blasted, removed and stockpiled. The destruction of the topography would result in the most significant impacts to paleontology, livestock grazing, cultural, and visual resources. Impacts are discussed under this and Preference Right Lease Issuance.

The primary impact on the mineral resource of the EIS Region would be the removal of the coal beds and destruction of the overlying strata by surface mining. Table 3-2 shows that under this alternative, approximately 8,000 and 16,000 acres would be disturbed in 1987 and the year 2000, respectively. A total of 25,000 acres would be disturbed over the life of the mine by mining.

Construction of mine and transportation facilities would result in the consumption of sand and gravel. The location and amount of these materials in the quarries cannot be approximated at this time.

Exploration for or recovery of oil and gas is currently at a low level. Once coal mining is completed, exploration and recovery of oil and gas could occur.

PALEONTOLOGY

Expected development could destroy paleontological resources of the Late Cretaceous Crevasse Canyon, Menefee, Fruitland and Kirtland Formations. Fossils found in the Fruitland/Kirtland Formations are an important part of an almost complete biostratigraphic sequence of events which depict one of the most important episodes in evolutionary history--—the transition from domination of terrestrial communities by dinosaurs to domination by mammals. Most fossils found in place in the overburden have the highest potential scientific value because they are generally far more complete and less damaged than fossils that have weathered out into alluvial plains on stream channels. Thus they provide much more valuable information about their evolution and contextual relationship with contemporary paleobiota.

Some paleontological resources in the overburden would likely be damaged or destroyed in some way by the mining process (e.g., blasting, scraping, dragline). These impacts are the most serious type that would occur to paleontological resources, and they cannot be mitigated. The construction of haul and access roads, new railroads, and surface facilities at mine sites would also destroy fossils.

Development of additional coal mines would also produce a population increase in the San Juan Basin. This and the building of additional roads in the EIS Region would permit increased human access to fossil-collecting sites in and near the mine development areas. As a consequence, unauthorized collection and vandalism of fossils would occur.

Despite the above impacts, however, paleontology will realize a certain degree of benefit from implementation of the No Action Alternative, because an excellent opportunity exists to interface paleontologic studies with contemplated mining activities. A cooperative agreement would be worked out with the New Mexico Museum of Natural History to curate the fossils for the benefit of the citizens of New Mexico. During mining, some subsurface paleontologic information that would otherwise be unavailable to the scientific community would become available. Such data would be important for an increased understanding of the life forms and environment of the region during prehistoric times. However, reclamation would limit the time that new exposures are available for continued fossil yields and maintenance of reference sections for future studies. Also, the benefits would be limited because the most significant paleontological resources are small and likely to be destroyed without even being discovered.

A comprehensive discussion of the potential extent of subsurface paleontological resources in the EIS Region is presented in Chapter IV (pages 1-3) of the Star Lake-Bisti Regional Coal Final ES (USDI, BLM, 1979c). The impacts of coal mining on paleontological resources under the PRLAs are treated in Chapter 3 (pages 24-25) of the Environmental Assessment for Coal Preference Right Leasing, New Mexico (USDI, BLM 1981a). Table 3-3 shows that under the No Action Alternative, an estimated total of 1,100 fossil localities would be disturbed.

SOILS

Soils would be temporarily disturbed on 25,000 acres as a result of mining and related activities, including community development. Enforcement of existing regulations would preclude significant adverse impacts pertaining to soil erosion and reduction in soil productivity on reclaimed areas. Reclamation of soils disturbed by off-road recreation vehicles would not be the responsibility of the mining companies so the disturbance would constitute an adverse environmental impact where ORVs are used indiscriminantly. After reclamation, many of the sites that were disturbed for mining would have erosion rates less than the present due to slope modification, erosion control structures, and revegetation.

RECLAMATION POTENTIAL

Actual revegetation experience in the San Juan Basin is limited primarily to the San Juan and Navajo coal mines. Over time, the revegetation efforts at these mines have improved to the point where they have been establishing adequate plant cover. While this benchmark has been achieved to a certain degree, revegetation has not existed for sufficient time to evaluate fully whether the reestablished vegetative community will be capable of self-regeneration and plant succession; and long term plant diversity is questionable. In addition, since the lands have not been subject to grazing pressure, their tolerance for grazing use is uncertain. Additional research over 5 or more years will be needed to have actual data upon which to evaluate these factors. In the interim, the scientific community has expressed some disagreement over the expectation of the future success of the new vegetative communities.

TABLE 3-3

ESTIMATED TOTAL OF FOSSIL LOCALITIES AND TOTAL ACRES DISTURBED BY ALTERNATIVE

Alternative	Total Acres Disturbed	Estimated Total Number Fossil Localities Disturbed
No Action[a/]	25,000	1,100
Preference Right Lease Issuance[a/]	22,020	1,137 (Known)
Bypass[a/] (8 tracts)	6,130	271
Minimum Surface Owner Conflicts [a/] (11 tracts)	19,302	136
Target[a/] (24 tracts)	35,977	1,400
High[a/] (39 tracts)	68,641	1,693

Note: [a/] Impacts are attributable solely to this particular alternative and/or action.

Two mines in the San Juan Basin have been formally evaluated to determine whether revegetation is technologically and economically feasible under current regulatory standards: the Burnham Mine and the Gateway Mine. In 1979 the Office of Surface Mining approved a permit for revegetation of the Burnham Mine on the Navajo Reservation. The OSM concluded that if certain procedures were followed during reclamation, revegetation was technologically and economically feasible (OSM, Mining and Reclamation Plan, 1979). It placed a 7-year limitation on mining due to the uncertainty of available data on diversity and plant succession. This decision was challenged in court and upheld.

In 1982 the State of New Mexico concluded that revegetation at Sunbelt Mining's Gateway Mine was technologically and economically feasible (State of New Mexico, Conclusions of Law, 1982). The Gateway Mine presented unusually difficult revegetation problems because such a large proportion of the land overlying the coal at the mine is sandstone, and only a small proportion is suitable topdressing material.

The past experience in the San Juan Basin with revegetation is generally applicable to the lands subject to coal leasing and leads to the conclusion that revegetation on all leases will be technologically and economically feasible assuming:

1. Subsequent experience confirms current revegetation success trends.
2. Acquisition of additional site-specific information on soils, water availability, and related factors at the permit stage do not uncover new or unusually unfavorable combinations of unfavorable characteristics, such as high soil toxicity combined with inadequate availability of alternative topdressing material.

Overall, while revegetation could succeed in the region a worst-case analysis is required in order to establish what will happen if reclamation is not effective. It is possible that some of the lands affected by surface coal mining would be made incapable of retaining a vegetative cover. This would result in erosion, increased air pollution, increased sediment loads, reduction in water quality, loss of soil productivity, and decrease in economic returns from livestock operators. The worst case is not likely for all but a small amount of the land which may be affected by mining.

In the normal situation, the vegetation destroyed by surface coal mining operations will begin growing within 1 year after the overburden and topsoil has been replaced, and will become established within 2 to 3 years. Vegetation will also be fenced for 6-10 years to protect new growth from grazing. At that time, the lands would be restored to grazing use for 2 years. If at that time the vegetation cover cannot sustain grazing pressures, it would again be protected from grazing for additional years until it was thought that grazing could resume. Not sooner than 10 years after the last added seeding, fertilization, or irrigation, would the lands be finally evaluated for revegetation success. If revegetation was successful, the lessee's revegetation bond would be returned, and the lands would be restored to full, normal use. If revegetation was not successful, all or part, as needed, would be replanted either by the lessee or under bond forfeiture proceedings.

The cost of acquisition for more detailed information on soil characteristics and particular revegetation regimes that should be followed to maximize revegetation on each competitive and PRLA tract would be exhorbitant. It is not necessary, however, for a reasoned decision since, detailed surface mining act regulations governing revegetation will control whether and how mining will be allowed. Each person that receives a lease does so knowing that mining could be disallowed in whole or part if regulatory requirements are not met.

WATER RESOURCES

Surface Water

The specific impacts on surface-water resources for an individual coal tract cannot be adequately evaluated given the existing information; however, the impacts can and will be addressed on a site-by-site basis during the evaluation of the applicant's mining and reclamation plan and prior to the granting of a permit to mine. The following description of general impacts is based on the assumption that the mine operators will comply with the regulations of the New Mexico Coal Surface Mining Commission (CSMS, Rule 80-1, Section 20-41 and subsequent sections) and other applicable State and Federal regulations.

In general, the potential impacts on surface-water resources are far less significant than the impacts on ground-water resources. As with re-vegetation, the cost of gathering additional site-specific information is exhorbitant, and is not necessary to a reasoned leasing decision due to specific and strict requirements.

Surface Water Quantity

The major impact on surface-water resources would be the destruction of natural drainage patterns by the removal of the overburden in the mined areas. Any existing stock tanks and playa lakes would also be destroyed. Surface runoff and streamflow that originate upstream from the mined areas would be diverted around the areas unless the mine operator obtains water rights. Runoff from precipitation falling on the disturbed areas would generally be impounded behind retention dams. Most of the impounded water probably would evaporate; sediments would tend to settle on the bottom of the pool and thus reduce infiltration into the soil. The decrease in area contributing surface runoff would reduce streamflow and recharge to the alluvium downstream from mining operations; however, the discharge of water from mine dewatering (treated to comply with effluent regulations) could cause increased flow and recharge downstream from underground mines. Extensive ground-water withdrawals at mines and the resulting loss in hydraulic head could slightly decrease ground-water discharge to the San Juan River, and thus decrease flow, and reduce spring discharge from the Chuska Sandstone.

Changes in the amount of runoff from mine areas after reclamation would be dependent on the degree to which topography and water infiltration rates are changed. In general, the combination of the reduction of steep slopes, the elimination of badland areas, and the increase in surface permeability caused by the addition of planting medium and the establishment of vegetation would tend to decrease runoff volumes.

Shown and others (1981) evaluated the potential impacts of surface mining and reclamation at Tsosie Swale, a small basin in the Chaco River drainage. Estimates of peak streamflow and runoff volumes following reclamation were 30 to 70 percent of the premining estimates.

Surface Water Quality

The New Mexico Surface Coal Mining Commission Regulations require the use of the best available technology in the design, construction, and maintenance of diversion structures, sediment ponds, and treatment facilities to prevent or minimize adverse changes in water quality. In no case shall Federal and State water quality statutes, regulations, standards, or effluent limitations be violated (Section 20-41 (c)).

During mining, streamflow originating upstream from the disturbed area generally would be diverted around the area; thus, the quality would not be affected. Surface runoff from the disturbed areas would be impounded in sediment ponds and either evaporate or be treated to comply with appropriate regulations before release to a stream channel. After mining, the sediment ponds and treatment facilities would be maintained until the disturbed area has been reclaimed unless the mine operator can demonstrate that the runoff from the mined area is of as good as or better quality than the water entering the mined area.

Data about water quality following mining and reclamation are very limited. The data available are from reclamation plots at the San Juan Mine near Waterflow and the Navajo Mine near Fruitland (Appendix Table B-10). The analyses are from samples of surface runoff collected immediately downslope from the plots; it is not known if the runoff reached any stream channels. The concentrations of most chemical constituents were well within the ranges present in streamflows. The pH values generally were slightly lower and some trace element concentrations were higher than average values. The April 1982 samples from the San Juan plots had much greater than normal concentrations of some constituents. Presumably the precipitation was of sufficient intensity to expose spoils to runoff.

The most significant potential impact of surface mining and successful reclamation on water quality would be a decrease in the sediment yield of the disturbed areas. The same factors responsible for decreasing surface runoff (see preceding section) would tend to decrease the amount of sediment these areas contribute to steam flow. In their evaluation of potential mine tracts, Summer (1981) and Shown and others (1981) provide detailed discussions leading to their predictions of significant reductions in sediment yield following mining and reclamation.

The preceding description has addressed the general long-term impacts of mining and reclamation. The possibility of short-term, though very significant, impacts also exists. Occassional accidental spills of large quantities of fuel oil or gasoline at the mining operations could occur and cause serious contamination of surface-water supplies. Precipitation events exceeding the specified design criteria for impoundments and diversion structures could cause very large peak flows of water containing abnormally high concentrations of chemical constituents and suspended sediments.

Ground Water Quantity

Continuing development of coal under this alternative would result in a ground-water pumpage of about 3,600 acre-feet per year in 1987 and would increase to a peak-use of about 7,800 acre-feet per year by 2000. Water rights applications (on file at the New Mexico State Engineer Office) indicate that much of the water will come from three major aquifers, the Entrada Sandstone, Westwater Canyon Member of the Morrison Formation, and Gallup Sandstone. Smaller amounts of water will come from more minor aquifers such as the Point Lookout, Cliff House, and Pictured Cliffs Sandstones.

Generalized impacts of surface coal-mining to ground-water resources are described below. These impacts are similar for all alternatives. The nature of the impacts do not change. The severity of the impact is a function of the scale of the mining.

Surface mining of coal beds would disrupt several aquifers in the San Juan Basin. As mining proceeds through alluvial channels, local sources of shallow ground water would be destroyed. Once these areas are reclaimed, less runoff and therefore less recharge may be available to ground water in the alluvium. However, this impact would be very localized.

Surface mining would destroy the stratified nature of the overburden as well as the coal seam itself. Although not important regional aquifers, the geologic units in the overburden do yield water locally to wells.

Depending on the location of a particular mine, the coal-bearing zones are directly underlain by regional sandstone aquifers (Gallup or Dalton Sandstones, for Crevasse Canyon Formation mines; Point Lookout Sandstone, for Menefee Formation mines; or the Pictured Cliffs Sandstone, for Fruitland Formation mines). These sandstones would not be completely destroyed by surface mining, but well yields could be affected locally, for the life the mine through drawdown of water levels. If dewatering of underground mines were required, water yields from wells completed in these units would decrease. Each ground-water withdrawal would create a cone of depression near the well and lower the water level in the aquifer(s) tapped.

All wells located in areas to be mined could be destroyed, regardless of the aquifer tapped. However, Section 9-21 (a) (3) of the New Mexico Surface Coal Mining Regulations requires that mining companies either protect or replace existing water sources, thereby mitigating adverse effects on existing users.

Mining companies would obtain most water to be used for operations, dust control, and reclamation from "deep" aquifers beneath mines. Any company wishing to appropriate ground water in the EIS area must submit an application to the New Mexico State Engineer. These applications identify aquifers to be tapped and quantities of ground water to be used per year. The applications are subject to protest by senior ground-water users in the area. The State Engineer carefully analyzes the impacts of each ground-water withdrawal before issuing a permit to appropriate the water. He has the option to approve, modify, or deny any application. The State Engineer is currently considering applications only from mining companies holding PRLAs and existing leases, thereby mitigating adverse effects on existing users.

The State Engineer requires protection or replacement of existing wells by the applicant. New Mexico Surface Coal Mining Regulations (Section 20-54) require compliance with any water-replacement plan approved by the State Engineer.

Ground Water Quality

The coal beds of the Crevasse Canyon, Menefee, and Fruitland Formations commonly have overburden of shales, carbonaceous shales, siltstones, and sandstones; they are commonly underlain by shales.

During mining, the stratified nature of the overburden would be destroyed. Following mining, the mixed and crumbled overburden would be placed back into the pit and regraded. This mixed overburden would have a porosity greater than the original stratified material and would act as a single homogeneous aquifer overlying either the Gallup on Dalton sandstones (for Crevasse Canyon Formation mines), the Point Lookout Sandstone (for Menefee Formation mines), or the Pictured Cliffs Sandstone (for Fruitland Formation mines).

Van Voast, and others (1977) studied the effects of coal surface-mining on ground-water quality near Colstrip, Montana. These authors found that in the mixed overburden spoil zones the quality of water in younger mined areas was similar to that from nearby, undisturbed aquifers. Spoils from older mined areas contained more highly mineralized water.

Water that resaturated the mixed and crumbled overburden would slowly mineralize and flow downgradient into shallow aquifers. If those aquifers contained water of better quality than that from the spoils, then a water-quality impact would occur. The magnitude of any impact is not predictable at this time for various reasons including unknown quality of water that resaturates the spoils, amount of recharge to spoils, and the type, distribution, and leachability of spoil materials (Woessner, 1979).

The greatest ground-water quality impact would probably be to the alluvial aquifer downstream from a mined area. In the San Juan Basin, water from alluvium is commonly of better quality than that from adjacent coal-bearing rocks. The quality of water in the alluvium could be reduced by seepage from spoils and subsurface flow. Any bedrock aquifer (Gallup, Dalton, Point Lookout, Pictured Cliffs Sandstones) connected to a spoils area could also be impacted in a similar manner.

VEGETATION/LIVESTOCK GRAZING

Change from a principally grazing and ranching scenario to mining and support uses is expected to occur. This would occur during the construction and production phases of existing state and federal leases, proposed mines under contract commitments or mine plans and other federally approved projects.

Land changes from grazing to mining and support uses could eliminate livestock grazing on such lands until reclamation is complete. Due to variability of grazing numbers, land ownership and seasons of use in the EIS region, any actual AUM losses can only be estimated and are shown in Table 3-4.

TABLE 3-4

VEGETATION, AUMs, AND LIVESTOCK IMPROVEMENTS IMPACTED BY ALTERNATIVE

Alternative	Vegetation Removed (Acres) 1987	2000	Total	Forage Removed (AUMs) 1987	2000	Total	Livestock Improvements (Total)
No Action	8,000	16,000	25,000	1,052	2,105	3,157	Unknown
Preference Right Lease Issuance	651	9,113	22,020	58	819	2,041	10 Reservoirs 21 Miles of Fence 3 Cattleguards 2 Corrals 4 Wells
Bypass [a/]	494	897	6,130	43	82	603	4 Reservoirs 2 Miles of Fence 1 Well
Minimum Surface Owner Conflict [a/]	638	2,180	19,302	114	455	4,268	9 Reservoirs 13 Miles of Fence 6 Wells 1 Spring
Target [a/]	1,819	4,563	35,952	257	730	6,045	15 Reservoirs 31 Miles of Fence 9 Wells 1 Spring
High [a/]	3,771	8,863	68,641	490	1,230	9,977	28 Reservoirs 73 Miles of Fence 1 Corral 17 Wells 1 Spring

Note: [a/] In order to determine cumulative impacts for a particular alternative include the impacts from new coal leasing plus the impacts of coal leasing from the No Action Alternative and PRLA Lease Issuance.

Livestock grazing would be temporarily lost on approximately 25,000 acres for the life of the mine or until reclamation is complete which could be an addtional 5-15 years. The actual availability of the reclaimed area for grazing would depend upon the procedures and time frame specified for reclamation in a mine plan and the success of the procedures used to reclaim the area. These acres and AUM figures represent less than one percent of the total found in the EIS region.

The lowering of water levels in aquifers due to exploration and production activities could reduce livestock water resources used by Navajo livestock. If water is used in large enough quantities water levels could also be lowered, thus reducing water resources for livestock and farming on the Jicarilla Reservation. These activities could also destroy water impoundments used by livestock.

Congestion caused by new developments and increased traffic in the coal region would result in a greater hazard of vehicle collisions with migrating livestock, and make moving livestock to and from grazing use areas difficult. Ranchers may also have to acquire additional feed to prevent reductions in livestock numbers on private offtract areas during seasons of non-use on the tract areas. The proportion of land affected by mining to the total land available for grazing in the region is small (<1%). No significant regional effect is expected.

WILDLIFE

All wildlife species and their habitats were analysed and the impacts to these species were not determined to be major. Therefore, dicussion of these species and their habitats will not be further addressed in this document.

Species of High Federal Interest

Increased human activity associated with construction of surface facilities and coal mining could disturb, through harassment, migrating, wintering, or nesting prairie falcons, ferruginuous hawks, and golden eagles. It is not known which, if any, or how many of the nests would be deserted or destroyed. No density figures for these raptors are available, however golden eagles occur in large enough numbers at any time of the year to be considered common residents. Shooting of raptors may become a significant factor in areas where powerlines would follow roads. For example, within the Navajo Agricultural Products Industries facilities just south of Farmington, wintering raptors concentrate in irrigated fields. Suitable perches in the form of powerlines follow many of the roads and during winter months as many as two dead raptors per mile may be counted under power poles as a result of shooting. These losses will increase due to expected development but are not expected to be substantially greater than current losses.

The nesting season would be the most critical season, with harassment at nest sites an additional problem. Generally, for prairie falcons, ferruginous hawks and golden eagles, disturbance early in the nesting cycle (February-May) would result in some nest desertion, with a few birds attempting to re-nest. Human intrusion later in the nesting season when nestlings are being cared for would result in somewhat less nest desertion, although

productivity of the raptor population as a whole would suffer. No direct effect from mining is expected due to protective lease terms and federal laws.

THREATENED OR ENDANGERED SPECIES

In addition, T & E surveys would be required at the mine plan stage. Should any evidence be found concerning T & E species the consultation process would resume and appropriate steps taken to insure no jeopardy to the continued existence of any endangered species.

CULTURAL RESOURCES

There are 470-950 cultural sites predicted to occur under this alternative. Salvage excavation of threatened archaeologic or historic sites may be required. Data would be preserved, but sites or portions of the sites would be lost.

Some loss would occur for buried sites encountered during dirtmoving operations even if they were recognized early. Changes in the setting of sites, either by the introduction of project activities and facilities or by moving facilities to avoid impacts, would degrade archaeologic and historic values. Vandalism impacts would occur due to an increased population and easier accessibility.

Positive impacts would also result from coal development. Valuable information has been gathered and other surveys could be necessary prior to any disturbance. The additional surveys would result in the accumulation of data that would otherwise not have been available until the future, or which may have been lost. Any salvage excavation that is required will result in the preservation of data and material (including some that might otherwise be lost to vandalism), although in situ value is lost.

VISUAL RESOURCES

More urbanization would occur in existing communities; improved or extended access roads and secondary ancillary facilities would be needed. In some cases the visual character of smaller outlying communities would be changed from rural agriculture to one of more urbanization. Some secondary visual resource degradation would be caused by dust from increased industrial activities, and by indiscriminant increases in ORV use, littering and vandalism. In addition, road construction and utility line construction would introduce strong axis lines which would change the natural landscape character. To some individuals, this would detract from the enjoyment of viewing the landscape; to others, new roads would provide additional access to scenic enjoyment (USDI, 1981).

WILDERNESS

Existing coal lease NM-0186615 and the southern portion of NM-0186612 are in close proximity to the Bisti WSA. The sights and sounds associated with

surface mining of these leases could disrupt the wilderness characteristics of naturalness and opportunities for solitude in this WSA. Objectionable sounds could include sirens and noises from blasting, operation of equipment, and transportation. Visual effects could result from the viewing of mining structures and operations from within the WSA, lighting of the sky during night operation, and decreased visibility due to the dust produced by mining. The impacts of mining on the Ah-shi-sli-pah WSA, if it is not designated as a wilderness area, are discussed under the PRLA Issuance Alternative. Similar impacts to mining the De-na-zin WSA would occur. However, if the De-na-zin WSA is not designated as wilderness it will be designated as an Area of Critical Environmental Concern (ACEC) as approved in the Chaco Management Framework Plan. The Bisti WSA falls under the same situation, but with additional measures being taken to ensure that mining does not occur within the WSA boundaries.

Secondary or indirect impacts (overcrowding, loss of solitude, serenity) are expected to occur on all of the WSAs under the No Action Alternative. These impacts would result from increased use of the WSAs by an influx of people into the EIS Region. Increased littering, vandalism of scientific and educational values (paleontological and cultural), and off-road vehicle use are anticipated. A Wilderness Management Plan, which would be prepared after Congressional designation, would identify the necessary visitor management actions needed to preserve the wilderness character of the areas.

Other projects that could be expected to affect wilderness resources include the Star Lake-Bisti Railroad and the Fruitland Coal Load Transmission Line. Noise from the railroad would be audible in the Bisti and Ah-shi-sle-pah WSAs, and the transmission line would be visible from within the Ah-shi-sle-pah WSA.

RECREATION

Increased population associated with coal mining and related industries in the EIS Region would result in increased participation in hunting, hiking, fishing, camping, water skiing, float boating, ORV use and sightseeing, thus causing more pressure on the area's recreation resources. Among the places receiving more use would be Navajo Lake, the San Juan River, the Chaco Culture National Historical Park, Angel Peak, and the Ah-shi-sle-pah, De-na-zin and Bisti WSAs. It is possible that some increase in recreational use would occur in the Jicarilla Apache Reservation, but it is expected to be minimal. Overcrowding could become a problem at some of these areas. Increased litter, vandalism, and damage resulting from ORV use could occur due to an increase in population.

Roads in many of the mining areas will be improved, thus allowing increased access to recreation attractions. Some people could find coal development interesting, adding to their recreational experience.

Noise from the Star Lake Railroad would distract from the recreation experience in the Bisti Management Area, the Chaco Culture National Historical Park, and possibly the CDNST.

An exact determination cannot be made of the amount of acreage removed from dispersed recreation use in any given year as a result of the

various projects, but it is expected to be a very small percentage of the total recreation acreage available. However, nearly 25,000 acres would be unavailable for dispersed recreation for the life of the mine.

LAND USES (Roads, Railroads, Pipelines, Transmission Lines)

The total acreage of rights-of-way for roads, powerlines, natural gas pipelines, and railroads and other projects are unknown. An unknown number of acres of these facilities rights-of-way would be disturbed by having to relocate the facilities to other areas.

Natural gas pipelines could be jeopardized by subsidence fracturing the lines. Leakage in high pressure gas lines could create a safety hazard, and could disrupt service to customers. Subsidence could cause some change in wire tension and create safety hazards with sagging power lines. Power lines are required to be of a specified tension to conform to regulations. Existing lease requirements should be effective in preventing these kind of occurrences.

Other land uses such as livestock grazing and recreation are discussed in those sections of this chapter.

TRANSPORTATION

Table 3-5 shows predicted increases in car and light duty truck traffic due to the development of coal and other projects in the EIS Region. Increases were projected for the years 1987 (start-up) and 2000 (peak production).

The largest increase in average daily traffic would occur along two major routes connecting the tri-city area of Farmington, Aztec, and Bloomfield. One route includes segments of New Mexico 44 and New Mexico 57, and the other route is NM 371.

The highways listed in Table 3-5 are the major arteries to access the coal region but other public roads (e.g., county and Bureau of Indian Affairs) are located in the vicinity. The No Action Alternative would add about 332 vehicles per day (vpd) to highways in the area by 1987 and about 387 vpd by the year 2000. This increase can be compared to the existing average vpd in Chapter 2 (refer to Table 2-11).

Increased noise, air pollution, traffic accidents, road congestion, maintenance and construction, and animal road kills could result from an increase in traffic. Because most of the rangelands are not fenced, additional traffic on these roads could result in an increase in the number of accidents involving livestock.

The increased number of accidents projected as a result of the additional traffic from mining under the No Action Alternative is listed in Table 3-6. Increases would occur on New Mexico 44 and New Mexico 371 in 1987 and the year 2000.

TABLE 3-5

PROJECTED ANNUAL AVERAGE DAILY TRAFFIC (ADT) INCREASES
ON HIGHWAYS IN THE EIS REGION BY ALTERNATIVE

Alternative	NM 32 [a]		I-40 [b]		NM 44 [c]		NM 53/344 [d]		NM 57 [e]		NM 170 [f]		NM 197 [g]		NM 371 [g]		NM 509 [g]	
	1987	2000	1987	2000	1987	2000	1987	2000	1987	2000	1987	2000	1987	2000	1987	2000	1987	2000
No Action [h]			8,337	8,386	5,184	5,186					3,584	3,585			+16	+19		
Preference Right Lease Issuance [h]	----	----	----	----	5,239	6,499	----	----	2,275	3,535	----	----	+6	+158	+84	+1,344	+16=	+
Bypass [h]	----	----	----	----	----	5,271	----	----	----	2,307	3,637	----	----	+26	+19	+52	----	----
Minimum Surface Owner Conflicts [h]	----	----	----	----	5,189	5,705	3,962	4,428	2,225	2,741	3,637	4,104	----	+26	+19	+52	----	----
Target [h]	----	----	----	----	5,189	5,808	3,962	4,428	2,225	2,844	3,637	4,104	+31	+175	+79	+294	+39	+505
High [h]	1,559	1,823	8.060	8,471	5,189	5,808	3,985	4,521	2,225	2,844	3,642	4,186	+31	+338	+167	+752	+39	+505
																	+62	+598

Notes:
[a] 1980 Baseline = 1,541 ADT
[b] 1980 Baseline = 8,055 ADT
[c] 1980 Baseline = 5,155 ADT
[d] 1980 Baseline = 3,923 ADT
[e] 1980 Baseline = 2,191 ADT
[f] 1980 Baseline = 3,579 ADT
[g] 1980 Baseline = No traffic surveys were completed for 1980.
[h] Impacts are attributable solely to this particular alternative or action.

TABLE 3-6

PROJECTED TRAFFIC ACCIDENT INCREASES ON HIGHWAYS BY ALTERNATIVE

Alternative	New Mexico 32 [a]		New Mexico 44 [b]		New Mexico 197 [c]		New Mexico 371 [d]	
	1987	2000	1987	2000	1987	2000	1987	2000
No Action				289			73	73
Preference Right Lease Issuance [e]	—	—	289	308	—	—	76	141
Bypass [e]	—	—	288	290	—	—	73	75
Minimum Surface Owner Conflicts [e]	—	—	289	296	—	—	73	75
Target [e]	—	—	289	298	18	22	77	90
High [e]	48	49	289	298	18	28	82	113

Notes: [a] 1980 Baseline = 47 Accidents
[b] 1980 Baseline = 288 Accidents
[c] 1980 Baseline = 17 Accidents
[d] 1980 Baseline = 72 Accidents
[e] Impacts are attributable solely to this particular alternative or action.

SOCIAL AND ECONOMIC FACTORS

Development expected in the Region without competitive coal leasing would generate substantial change. Table 3-7 shows the estimated level of change for the factors most likely to be additionally impacted by competitive coal development.

Employment is estimated to show baseline increases (no competitive leasing or PRLA Issuance) ranging from 12 percent in the Crownpoint-Thoreau area to 60 percent for the Cuba area for 1987. Year 2000 baseline increases are estimated to range from 27 percent for Crownpoint-Thoreau to 173 percent for Cuba.

Population increases are expected to follow the pattern of employment with low percentage increases in the Crownpoint-Thoreau area and high percentage increases occurring in Cuba.

The increase patterns are shown for other factors that increased substantially under baseline development. These factors include housing needs, community expenditures, water use and wastewater treatment. The village of Cuba will have substantial increased needs for nearly all services because they are expected to have a rapid and sustantial population growth even under the baseline projections.

AMERICAN INDIAN CONCERNS

Impacts to the Jicarilla Apaches as described below for the Navajo could occur but it is felt that because of their location, being removed from the natural area of mining, that if they were affected it would be minimal.

Impacts on the values, beliefs and lifestyles which influence subjective quality of life of the Navajo are difficult to assess. Experience has shown that a large number of adverse health effects will occur as a result of this alternative. In two areas of Colorado and Wyoming which underwent a similar sort of energy resource development, several measures of health deteriorated strikingly.

Injuries to children from child abuse and neglect increased three times faster than the population did during the period of energy development; injuries to wives from spouse abuse also increased three times faster than the population. Admissions to mental health hospitals increased ten times faster than the population during this period. Measures of alcohol and drug abuse effects on health increased fifteen times faster than the population, and injuries from asaults increased twenty times faster. It should be noted also that the studies in Colorado and Wyoming did not examine increases in injuries due to vehicular accidents. (Davenport, 1980).

While the data came from areas where the population was culturally and ethnically uniform, the development of the San Juan Basin will result in ethnic and cultural clashes. The result will be increases in a variety of mental stresses and an increase in the disease measure just referred to.

The effects on health are likely to be worse for reasons that are unique to the area. Relocation of Navajo families from homesites that they have occupied for generations will markedly increase incidences of mental illness, as it has elsewhere where Navajos have been relocated. This could affect up to 22,000 Navajos who may have difficulty, pursuing their traditional lifestyle.

The destruction of gravesites and sacred sites, and violation of the land will make matters worse and cannot be absolved simply by traditional ceremonies. The Navajos in the area that have low, relatively fixed incomes are not likely to benefit economically from the development, and yet they will likely suffer from price inflation accompanying the boom. This situation will be another aggravation of mental illness. All of these will affect both those directly involved in the development, and those "bystanders" living in the region. The end result will be a dramatic increase in measures of alcoholism, accidents, injuries from assults, and mental illness. (Davenport 1980).

To summarize, the No Action Alternative will result in adverse effects on the health of the people of the area. The Crownpoint Service Unit, a Division of the Indian Health Service which provides the health care for about 17,000 Navajos living in a 3,500 square mile area of the San Juan Basin, is already overburdened and will be unable to adequately meet the increased need.

Access to portions of grazing use areas extending outside mine areas could be disrupted by mining operations. Rotational grazing practices could be interrupted for livestock operators losing use of a seasonal range. Some range outside mine areas could become unusable by livestock due to a decrease in the quantity and quality of available water.

As a general estimate, 20-40 years could elapse between the time an area was opened up by surface mining until grazing could be resumed. The actual availability of the reclaimed area for grazing would depend upon mine plan operation.

The local market for silver jewelry and for rugs could expand with the population growth of non-Indians. However, weavers displaced from mine areas could be forced to find new gathering areas for minerals and plants used in cleaning and dyeing wool. Weavers unable to maintain flocks of sheep and goats may have to purchase wool.

Removal of natural vegetation during surface mining could force traditional religious practitioners to seek new plant and mineral gathering areas for ceremonial use. The religious ceremonies may be totally destroyed if new gathering areas are not found. The seeds for many species may be very costly or may not be commercially available for inclusion in reseeding mixtures used by coal companies.

An area of possible positive impacts for the Navajo people is in the financial or economic sector, where jobs with higher income would be available. Jobs in mine construction and operation could partially reduce the current high rate of Navajo unemployment. The availability of highly paid mining jobs could improve the standard of living within extended families. Navajos now holding wage jobs in other locations may be able to find employment near their local residence groups. Tribal and racial rivalries could increase as Navajos from other areas, members of other tribes, and non-Indians compete with local Navajos for employment.

TABLE 3-7

BASELINE (NO ACTION) LEVELS FOR ECONOMIC AND SOCIAL FACTORS
1987 and 2000 WITH PERCENTAGE CHANGES FROM 1980

Economic or Social Factor	Farmington 1/		Cuba		Grants		Gallup		Milan		Crownpoint/Thoreau	
	1987	2000	1987	2000	1987	2000	1987	2000	1987	2000	1987	2000
Employment	27,440	32,020	1,992 2/	2,154 2/	12,118 2/	17,148 2/	6,700	7,892	1,855	2,630	764	933
% Change from 1980	25	46	59	72	1	43	21	42	19	68	12	27
			313 3/	535 3/	5,680 4/	8,038 4/						
% Change from 1980			60	173	17	66						
Housing Needs	19,200	22,450	314 3/	537 3/	9,551 5/	13,516 5/	7,351	8,631	5/	5/	668	816
% Change from 1980	16	36	16	99	82	157	13	33			6	30
Community Expenditures ($000)	71,876	83,980	485	829	16,572 4/	23,478 4/	4,684 8/	9,368 8/	5/	5/	NA 7/	NA 7/
% Change from 1980	27	49	60	174	25	77	21	42				
Water Use (Acre Feet)	745	4,413	94 2/	412 2/	233 5/	1,820 5/	124	711	5/	5/	5	266
% Change from 1980	5	27	26	115	8	6	5	26			<1	26
Wastewater Treatment (000 Gallon/Day)	2,835	5,080	43	124	253 5/	776 5/	227	463	5/	5/	16	50
% Change from 1980	27	48	60	173	25	78	21	42			12	37
Population	13,738	25,188	361	1,049	2,863	8,880	3,747	7,647	945	2,907	267	817
% Change from 1980	25	46	59	172	25	78	21	42	25	78	12	37

Note: 1/ Includes Farmington, Aztec, Bloomfield, and Associated Communities
2/ County Census Division Figures.
3/ Village of Cuba Figures.
4/ City of Grants Figures.
5/ Includes Grants and Milan.
6/ Included with Grants.
7/ Not Available.
8/ Estimated based on maintaining the expenditures at the 1980-81 per capita levels.

NONCOMPETITIVE COAL LEASE ISSUANCE

IMPACTS - PREFERENCE RIGHT LEASE ISSUANCE

This section addresses the environmental effects of (1) mining the 26 pending PRLAs with the currently proposed lease terms and conditions (Appendix I-2); this is the preferred alternative (2) placing alternative lease terms on those 26 PRLAs; and (3) exchanging the PRLAs for coal bidding rights or seeking legislation to transfer the rights obtained under PRLAs for other mineral rights. The alternative of withdrawing these lands is not discussed because the rights of a PRLA are such that a withdrawal would have no effect on leasing, since a withdrawal must be made subject to a PRLA holders valid existing rights.

The Department's regulations (43 CFR Part 3430) require PRLA holders to show they are entitled to leases by submitting a "final showing" which demonstrates that a prudent person would expend time and money to develop a mine with a reasonable expectation of making a profit, including consideration of the costs of complying with lease terms. Costs of complying with proposed lease terms is considered in the final showing process.

The Bureau has asked for and received a final showing from each of the 26 PRLA holders. The request for final showing expressly reserves to the United States the right to change any or all of the terms in the request for final showing after considering the environmental analysis and alternatives in this statement. The Bureau is reviewing the current final showings. If the lease terms finally chosen for a PRLA have no significant economic difference from the proposed terms, the tentative conclusion on the final showing could be ratified. Otherwise, the PRLA holder will have to submit a new final showing.

AIR QUALITY

Two air quality analyses were performed to provide input for this EIS. The first, by Pedco (1982), was a screening analysis to determine the air quality impacts of mining on each of the proposed competitive lease tracts and the PRLAs. The study first assessed each tract individually to determine significance of the impacts. A preliminary analysis was then performed to determine the cumulative impacts of proposed mines in close proximity to other mines. Results of the analysis indicated three areas (Bisti, Crownpoint to Lee Ranch East, and Gallup) showed potential problems and needed further analysis.

This further analysis was done by ECOS Management Criteria, Inc. (1982). ECOS used a computerized regional dispersion model to determine ambient concentrations of total suspended particulates (TSP) resulting from coal mining and transportation for each of the alternative levels of mining. Information regarding dispersion models, meteorological data and methodology can be found in Appendix G of this EIS. More detailed data is located in the technical reports done by Pedco and ECOS, copies of which are available in the Farmington Resource Area Office.

The development of the PRLAs is estimated to result in the emmission of 3,542 tons of total suspended particulates (TSP) per year. The resulting

24-hour ground level concentration of 100 ug/m^3 is shown in Table 3-1. The concentration does not exceed any of the New Mexico or National Ambient Air Quality Standards (NAAQS).

The frequency of occurrence of the 24-hour maximum value could not be determined with this analysis. The frequency of occurrence is influenced by the amount of emmissions from automobiles and industry and the atmospheric conditions of a particular day. More realistic 24-hour impacts could be obtained using a short-term model and appropriate 24-hour meteorological data when more detailed mine site information is developed at the mine-plan stage. As seen in Appendix G, the TSP concentrations are limited in spatial extent (beyond the coal lease boundaries), as would be expected of larger particles resulting from mining activities. The annual average concentration values are generally more appropriate for determining regional impacts. The 24-hour maximum was estimated from the annual values by the Larsen transformation method. Since the 24-hour value is considered a conservative value, it should be viewed with caution.

A Class II area, the Chaco Culture National Historical Park, was examined to determine if the TSP levels allowable under the PSD regulations would be exceeded. The increased TSP levels would be below the applicable Class II increments. The two Class I areas in closest proximity to the PRLA and competitive lease tracts (Mesa Verde National Park and the San Pedro Parks Wilderness) were also examined. The calculated TSP levels were significantly below the allowable Class I increments.

Fugitive dust particles suspended in air can cause a reduction in visual range as a result of the scattering of light. An approximate assessment of reduction in visual range from this alternative was made using the approach of Ursenbach (1978). Assuming an annual background concentration of 30 ug/m^3, the visual range would be reduced from 73 to 67 miles (by 8 percent). Short-term (24-hour) concentrations would result in a reduction of visual range to 32 miles, a decrease of 56 percent. Because of the rural nature of the area it is not expected that the loss in visibility would be appreciable.

Using the 73 miles of visibility calculated above for the Chaco Culture National Historical Park, visual range reductions would be 3 percent on an annual basis and 18 percent on a short-term, 24 hour basis.

Based on the use of the NAAQS and PSD standards as a measure of significance, the calculated increased TSP concentration from this alternative would not result in a significant air quality impact. According to the New Mexico Environmental Improvement Division the PSD baseline has been triggered. This means a baseline has been established and new projects must apply for a permit to utilize any of the remaining increment, (the remaining increment is defined as the difference between the baseline and the maximum PSD increment). Permits to consume PSD increment must be obtained from the State of New Mexico. The process for obtaining these permits must follow the procedures to be established by the State of New Mexico, and they will determine who receives the available increment. This could be determined by requiring more advanced technology, by

refusing new permits, or by letting the new projects "buy" increment from a current user, who would then utilize better technology or cease operations.

Since fugitive dust is not included under the current EPA and PSD regulations, it is not anticipated that any of the proposed mines will emit enough emmissions to require a PSD permit. Existing air quality regulations and requirements are expected to be effective in controlling air quality problems.

TOPOGRAPHY AND MINERAL RESOURCES

Surface Mining

The type of impacts associated with leasing this action would generally be the same as those identified under the No Action Alternative. Table 3-2 shows that under this action approximately 1500 and 10,000 acres would be disturbed in 1987 and the year 2000, respectively. A total of 22,020 acres would be disturbed by mining, of which 705 acres would be for surface facilities. Total acreage disturbed under this and the No Action Alternative would be 47,020 acres. Impacts to construction materials (sand and gravel) would be of the same type as discussed in the No Action Alternative.

Underground Mining

Underground mining would result in the removal of 50 percent (approximatley 241.9 milion tons) of the mineable coal beds. The remaining 50% would be unrecoverable under present technology. Underlying coal beds would not be disturbed and could be mined at a later date.

Destruction of the strata immediately overlying the underground mined tracts could occur as a result of subsidence. Subsidence could occur on an undetermined number of acres and would be the result of several variables, including: (1) mining methods (2) overburden thickness and type, (3) production rate and seam thickness, and (4) geometry of mine workings (USDI, MMS 1982). Subsidence would be greatest at the center of the mined-out area and much less in the peripheral areas. Surface expressions of subsidence could include open fractures, buckled and bulged bedrock, sinkholes, and other depressions. Subsidence could cause damage to structures or improvements located on underground mine areas. It could also become a safety hazard to individuals and also to livestock that could wander into the area. Subsurface and surface water sources for livestock could also be disrupted. Required lease conditions and regulations require subsidence to be controlled to prevent these kind of effects and should be effective in doing so.

PALEONTOLOGY

The type of impacts associated with this action would generally be the same as those identified under the No Action Alternative. Table 3-3 shows that under this alternative, 1,137 known fossil localities would be disturbed. The total number of fossil localities disturbed for this and the No Action Alternative would be 2,237. Existing lease term requirements are expected to be partly effective in mitigating effects on paleontological resources. Study and specimen receovery will gather significant information. This kind of mitigation

is relatively new, and current plans could develop practical problems causing loss of scientific data.

SOILS

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative. Surface disturbance at the onset of mining activities (1987) would consist of about 1,500 acres. Approximately 10,000 acres of surface disturbance would occur during peak mine production (year 2000). The total acreage disturbed by this and the No Action Alternative would be 47,020 acres (refer to Table 3-2).

A maximum of 80 acres per underground mine would sustain surface disturbance in the form of access roads, parking areas, storage yards, buildings, utilities, and mine structures. Surface structures and facilities associated with underground mines would result in vegetation removal and soil disturbance and thus susceptibility to wind and water action. Sediment rates would increase slightly because of vegetation removal and unstable soils, and the placement of mine structures and facilities would cause some soil compaction. Soil characteristics and properties (bulk density, permeability, productivity, potential, structure, infiltration rates, and micro-organisms) would be affected to some extent because of soil handling, transporting, and stockpiling. Soil contamination may occur because of accidental spills (man-made products) and toxic material from disturbed soils, bedrock, and spoil piles.

Projected reclamation potential discussed in the No Action Alternative is expected to be similar under Preference Right Lease Issuance. Required lease terms and regulatory requirements are highly effective in ensuring reclamation will be done effectively, and in preventing mining where revegetation is not economically and technologically feasible.

WATER RESOURCES

Surface Water

The general impacts on surface water caused by this action are the same as those described for the No Action Alternative. The nature of the impacts do not change; the magnitude of the impact is proportional to the amount of surface area disturbed. During mining and reclamation, the larger the area disturbed the less the area contributing surface runoff and the larger the decrease in streamflow and sediment. After mining, the larger the area successfully reclaimed the greater the reduction in sediment yield and streamflow. Increases in the number of mining operations may increase the possibility of accidental contamination of surface water and of failure of impoundments and diversion structures. Existing regulatory requirements should be effective in protecting hydrological balance and other surface water protection.

Ground Water

The type of impacts associated with mining under this action would generally be the same as those identified under the No Action Alternative. The impacts of energy development on ground-water resources of the San Juan Structural Basin are a major concern in this EIS. As such, there is a and the Navajo and Jicarilla Tribe. The degree of conflict depends on the rate of development on the lands and the legal availability of water. In an effort to quanitatively analyze these impacts, the BLM requested the U.S. Geological Survey, Water Resources Division (GS, WRD) to assist by making engineering estimates of these impacts.

The analyses were done by computer simulation (digital model of Frenzel and Lyford, 1982). This model and additional information is included in Appendix B-11.

Projected (model-derived) drawdowns for this action are shown on Plate 1 (enclosed with the Draft EIS). Maps on Plate 1 for each major aquifer (Model Layers 1, 3, 5, 6, and 7--refer to Appendix B-11) show drawdowns for the years 1987, 2000, 2020, and 2040. The greatest drawdowns (2,000 feet) would occur in the Westwater Canyon Member of the Morrison Formation (Layer 3) in the year 2020. The year 2040 map for this layer indicates a repressuring (or recovery of water level and inward movement of drawdown contours) in the middle of the cone of depression and continued depressuring (or drawdown of water level and outward movement of contours) near the basin boundary.

Results would be similar for the Entrada Sandstone (Layer 1). The greatest drawdown (600 feet) would occur in the year 2020, with recovery of water level in the basin center and continued drawdown towards the basin boundary in the year 2040.

In the Gallup Sandstone (Layer 5), the greatest drawdown (1,000 feet) would occur in the year 2020 near the Gallup area coal tracts. Drawdown in Layer 6 (Crevasse Canyon Formation) would reach a maximum of 30 feet in the year 2020. Drawdown in Layer 7 (Upper Mesaverde Group Sandstones) would reach a maximum of 300 feet in the year 2000. Maximum drawdown and the years they would occur for this alternative are summarized in Table 3-8. Total water needs for this and the No Action Alternative would be approximately 16,450 acre-feet per year. Lease terms and regulation by the State Engineer should be highly effective in protecting existing water users.

VEGETATION/LIVESTOCK GRAZING

Table 3-4 shows that the Preference Right Lease Issuance would temporarily remove approximately 22,020 acres of native vegetation and 2,041 AUMs of livestock forage on 12 BLM-BIA administered allotments (11%) over the life of the mines. This represents approximately 31 percent of the available forage within the PRLA Lease boundaries. In addition, 10 reservoirs, 21 miles of fence, 4 wells, 2 corrals, and 3 cattleguards would be destroyed by surface mining. By the start of production in 1987, there would be 651 acres of native vegetation removed and 58 AUMs of forage lost. At the peak of mining in the year 2000, there would be 9,113 acres of vegetation removed and 819 AUMs of forage. The total disturbance for this and the No Action Alternative would be

TABLE 3-8

MAXIMUM DRAWDOWN IN MAJOR AQUIFERS OF THE SAN JUAN STRUCTURAL BASIN,
FOR THE PREFERENCE RIGHT LEASE ISSUANCE

Alternative	Aquifer	Maximum Drawdown (Feet)	Year of Occurrence	General Area(s) of Occurrence
No Action	Entrada Sandstone	600	2020	Central Basin
	Westwater Canyon Member	2,000	2020	Central Basin
	Gallup Sandstone	1,000	2020	Gallup Area
	Crevasse Canyon Formation	30	2020	Gallup Area
	Upper Mesaverde Group Sandstones	300	2000	Central Basin

Note: Reference Plate 1, enclosed with the Draft EIS.

to 47,020 acres, 5,198 AUMs, 14 reservoirs, 23 miles of fence, 5 wells, 3 cattleguards, and 2 corrals. This represents 1.6 percent of the AUMs in the Chaco Planning Unit over the life of the mines.

The loss of AUMs would be most severe for individuals whose livestock graze community allotments and have very few AUMs. This loss of AUMs would result in a disruption of the allottee's traditional grazing lifestyle. The individuals who would lose their grazing privileges in one allotment could be absorbed by the allottees in another allotment by proportionally reducing the number of animal units each person would run and allow the individual who lost his or her AUMs to run livestock in their allotment. This could result in severe overgrazing and lead to friction and hostilities among community members. Loss of traditional grazing lands may cause trespass problems in some cases.

If operators were adequately compensated for the loss of forage they could lease pasture land or feed their livestock around their dwelling areas. Mining companies could also provide feedlot for the displaced livestock. Existing statutory protection for federal lessees will provide effective protection for operators.

WILDLIFE

Species of High Federal Interest

Increased human activity associated with mining under this action would have the same type of impacts on migrating, wintering and nesting prairie falcons, ferruginous hawks, and golden eagles that would occur under the No Action Alternative. No density figures for these raptors are available, however golden eagles occur in large enough numbers at any time of the year to be considered common residents. Under this action the nests of one prairie falcon and five ferruginous hawks on PRLAs would be affected by indirect human activities (Table 3-9). The indirect impacts of mining on birds of high federal interest would vary depending on the time of year. Birds would be vulnerable to shooting at any time, usually while perching on fences or power lines along roadsides.

The nesting season would be the most critical season, with harassment at the nest sites an additional problem. Generally, for prairie falcons, ferruginous hawks and golden eagles, disturbance early in the nesting cycle (February-May) would result in some nest desertion, with a few birds attempting to re-nest. Human intrusion later in the nesting season when nestlings are being cared for would result in somewhat less nest desertion, although productivity of the raptor population as a whole would suffer. Lease terms and regulations provide effective protection from damage that might be caused by mining operations.

Through the Section 7 consultation with the USFWS as required under the Endangered Species Act of 1973, and by correspondence with New Mexico Department of Game and Fish (NMDG&F), it was determined that there would be no significant direct or indirect impacts to threatened or endangered species (See Appendix D for documentation of the consultation process).

TABLE 3-9

RAPTOR NESTS AND CRUCIAL DEER AND ELK HABITAT AND ACREAGE DISTURBED BY ALTERNATIVE

Alternative	Acreage Disturbed [a] 1987	2000	Total	Total Number of Nests [b]
No Action				Unknown
Preference Right Lease Issuance [c]	—	—	—	1 Prairie Falcon 5 Ferruginous Hawks
Bypass [c]	160	200	200	1 Ferruginous Hawks
Minimum Surface Owner Conflicts [c]	160	200	200	1 Golden Eagle
Target [c]	160	200	200	2 Ferruginous Hawks 2 Golden Eagles
High [c]	212	200	300	2 Ferruginous Hawks 2 Golden Eagles

Note: [a] Crucial Deer and Elk Habitat.
[b] Nests of Species of High Federal Interest.
[c] Impacts are attributable solely to this particular alternative and/or action and are based on tract specific information.

CULTURAL RESOURCES

This action would result in increased scientific knowledge about past cultures in the PRLA Area. This knowledge would come from cultural resource inventories, the Chacoan roads project, and any site excavations that were carried out prior to mining. The value of the information retrieved from these mitigation measures would be directly related to the quality of available professional expertise.

Typically, cultural resource inventories and data salvage must be performed under very tight time frames because of the large amounts of capital and labor involved in energy development. These conditions rarely allow for the analysis of site data at the time it is collected. Money for analysis often is not available at a later time, and much of the potential value of the site data is lost. If analysis does occur, it may not be possible to resolve any new research questions that arise from the analysis because it is probable that few sites are intact. Based on presently available information, it is unlikely that the integrity of any site on the PRLA Area can be maintained under the Proposed Action without continual on-site monitoring.

A total of 171 known sites and an estimated 542 sites (Table 3-10) could be destroyed through mining activities. Total disturbance for this and the No Action Alternative would be 171 recorded sites and between 1,012 and 1,492 predicted sites. Sites left intact on pillars within mined areas would retain little scientific value.

Vibration from blasting, heavy mine equipment, haul trucks and trains could affect the stability of standing masonry walls and rock cairns. Twenty of the 26 PRLAs are within 10 miles of Chaco Culture National Historical Park and its detached parcels. (This 10 mile limit is an arbitrary figure. Only through studies on blasting affects on masonry structures will the critical distance of the blast from the site be known that will not cause structural damage). Blasting may weaken the standing walls of the structures within the park. Sites could be partially or completely destroyed by surface swells, tension cracks, and crumbling of the edges of mesas from subsidence of areas overlying deep mines. Judging from field observations of OSM archeologists (Killam, personal communication 1980), the occurrence of subsidence and its effects on archeological resources cannot be predicted.

Changes in present patterns of natural erosion could also affect sites. Alteration of present drainage channels could accelerate water erosion of some sites. Wind-borne soils from disturbed areas would be deposited in new locations, possibly burying previously visible sites in downwind areas.

The number of construction workers and permanent employees at the mines would be another source of potential damage to cultural resources not only to sites within tract boundaries but to sites outside tract boundaries. According to traditional Navajo belief, artifacts from the past should be left undisturbed. However, non-Navajos employed in the mines may not share Navajo beliefs regarding the handling of artifacts. Others with little knowledge or interest in past culture could contribute to the destruction of sites without being aware of their existence. Direct site vandalism would be another probable occurrence. Arizona, Utah and parts of New Mexico have witnessed a tremendous

TABLE 3-10

CULTURAL RESOURCE SITES IMPACTED BY ALTERNATIVE

Alternative	Sites Recorded 1987	2000	Total	Sites Predicted [b] 1987	2000	Total
No Action[a]						470-950
Preference Right Lease Issuance[a]			171			542
Bypass [a]			28	19-20	26-78	165-188
Minimum Surface Owner Conflicts [a]			213	19	58-78	600-708
Target [a]			412	32-44	132-245	814-1,105
High [a]			638	32-44	132-245	1,727-2,295

Notes: [a] Impacts are attributable solely to this particular alternative and/or action.
[b] These predictions assume that the sites are evenly distributed across each tract, which they are not. Therefore, the number of sites maybe either higher or lower.

amount of pot hunting and looting of cultural sites due to the increase in population associated with coal development and related activities. Direct or indirect damage from use of off-road vehicles would also occur to sites on or off the leased tracts. If permanent housing was constructed near the PRLA Area, site damage would be accelerated both by the increase in resident population and by the number of leisure hours the residents spent in the area. Lease terms and regulations should be highly effective in identifying sites before mining occurs and somewhat effective in analyzing information gathered.

VISUAL RESOURCES

The type of impacts associated with this action would generally be the same as those identified under the No Action Alternative. Under the Preference Right Lease Issuance, four PRLAs (NM-3834, NM-3838, NM-6801 and NM-11916) overlap the designated VRM Class II land of the Bisti and De-na-zin WSAs (see Visual B). All of these PRLAs are expected to be mined by underground methods. Disturbance caused by surface facilities for these mines could occur to the topography, natural scenic features, and visual quality on these PRLAs, which are composed primarily of fragile badlands.

Surface facilities on parts of NM-3838 and NM-11916 that lie outside of the Class II lands could reduce or disrupt the topographic and scenic view from the Bisti and De-na-zin WSAs. Parts of NM-3838 and NM-11916 are considered suitable for surface mining; this activity could have similar impacts on the nearby De-na-zin and Bisti Class II scenic areas.

Surface mining of PRLAs NM-3918, NM-3919, NM-8745, and NM-9764 could cause visual disruptions to visitors at Chaco Culture National Historical Park, especially from Pueblo Alto site.

All other PRLAs and projects fall within VRM Class III and Class IV lands. The same impacts as discussed above would occur, but would be less disruptive to the lower visual class of these areas.

WILDERNESS

The type of impacts associated with this action are in addition to and would generally be the same as those identified under the No Action Alternative. There are seven lease applications which overlap WSAs. The overlaps range from 1 percent (42.76 acres) on PRLA NM-6801 to 95 percent (4,591.28 acres) on PRLA NM-3834. The sights and sounds associated with surface mining of these PRLAs could disrupt the wilderness characteristics of naturalness and opportunities for solitude in the WSAs. PRLAs cover most of the Ah-shi-sle-pah WSA and these will probably be surface mined if the area is dropped from wilderness consideration, thus destroying the naturalness of the area and scenic resources. There are also PRLAs over a good portion of the De-na-zin WSA but the coal here is at a depth which makes only underground mining practicable. If this area does not become designated as wilderness, some impacts might occur to the wilderness character in parts of the area. On PRLA NM-3834, NM-3838, NM-3918, NM-3919, NM-6801, NM-6804, and NM-11916, a total of 13,424 acres (and an undetermined amount of coal) would be removed from mining and surface occupancy associated with underground mining. This would be done in compliance with the

unsuitability criterion that concerns protection of the areas' suitability for wilderness designation. Lease terms and processing procedures are effective in preventing damage to wilderness values during congressional consideration. They will also be effective in preventing adverse effects to areas' designated as wilderness.

RECREATION

The type of impacts associated with this action are, in addition to and would generally be the same as those identified under the No Action Alternative. Mining of the PRLAs could distract from the quality of the recreational experience in some areas of the EIS Region. Surface mining of the area presently known as the Ah-shi-sle-pah WSA, should it not be designated as wilderness, would destroy the scenic, backcountry, and primitive recreation values there. Surface mining of NM-11916, adjacent to the Bisti WSA would have detrimental effects on the primitive recreation experience in the management area due to the dust, noise, visual intrusions, and increased use.

Surface mining on PRLAs NM-3918, NM-3919, NM-8745, and NM-9764 could cause visual and noise distractions to visitors at major recreation areas in the EIS Region, including the Chaco Culture National Historical Park, and especially the popular Pueblo Alto site.

Mining of several PRLAs and existing leases could potentially distract from the visual qualities of the Continental Divide National Scenic Trail (CDNST) if it is eventually routed near or through them.

Should all applicants meet final showing and should coal development occur, 50,188 (Table 3-11) acres of accessible public land would be removed from public use for the life of the mines. This is expected to be a very small percentage of the total recreation acreage available. Public use on these tracts for participation in dispersed recreational hunting, collecting, sightseeing, off-road vehicle use, and back-country use can be characterized as relatively low-density use. However, those users would have to seek their recreation elsewhere.

Additional dispersed recreation demand from natural population growth, proposed coal leasing population growth, and displaced recreationists could diminish the quality of the recreation experience.

The increased traffic flow and rerouting of State Highway 57 could interrupt visitation to the Chaco Culture National Historical Park. The viewing of active mining along State Highway 57 would provide the opportunity to provide an interpretation program to those driving to and from the park.

Mining operations (as proposed in the initial showing of the various applications) indicate mining or surface disturbance from mining would occur within the boundaries of the proposed Bisti/De-na-zin Area of Critical Environmental Concern (ACEC) of the recreation program. Because this ACEC includes two of the Wilderness Study Areas (WSAs), no direct impact would be anticipated to occur on them.

TABLE 3-11

ACREAGE NOT AVAILABLE TO DISPERSED RECREATION USE
BY ALTERNATIVE [a]

Alternative	Year 1987	Year 2000
No Action [b]		
Preference Right Lease Issuance	23,100	50,188
Bypass	1,642	3,059
Minimum Surface Owner Conflicts	3,242	7,340
Target	10,052	15,357
High	23,962	30,145

Note: [a] These figures were derived by multiplying expected annual disturbance (acres) by the life of the mine (years) and adding surface facilities (acres) for each mine that would be in production during 1987 or the year 2000.

[b] Data not available.

The Continental Divide Trail, another proposal of the BLM's recreation program, would not be directly impacted by coal mining activities on the PRLAs. Visitor use of the trail could, however, be indirectly impacted by access roads, rail spurs, utilities, noise, and dust as a result of leasing. Some of these activities would intermittently impede use of the trail, present safety hazards and diminish the quality of the recreation experience for those visitors hiking the trail through the PRLA Area.

LAND USES (Roads, Railroads, Pipelines, Transmission Lines)

The total acreage of rights-of-way for roads, powerlines, natural gas pipelines, and railroads located on the surface mineable portions of the PRLAs are listed in Table 3-12. Approximately 276 acres of these facilities rights-of-way would be disturbed by relocation to other areas (refer to Table 3-12). On the underground mineable portions of the PRLAs, a total of 103 acres of rights-of-way would be affected (Table 3-13). (For further information refer to Appendix E-1 and E-2.)

Natural gas pipelines could be jeopardized by subsidence fracturing the lines. Subsidence from underground tracts could result in damage to public roads crossing these tracts (Appendix E-4 and E-5). Such damage would necessitate maintenance and possible reconstruction to make the roads safe. Leakage in high pressure gas lines could create a safety hazard, and could disrupt service to customers. Subsidence could cause some change in wire tension and create undesireable sagging of power lines.

Other land uses such as livestock grazing and recreation are discussed in those sections of this chapter. Lease terms and regulations should be effective to protect these land uses or to mitigate adverse effects.

TRANSPORTATION

Table 3-5 shows predicted increases in car and light duty truck traffic due to the development of the PRLAs and other projects in the EIS Region. Increases were projected for the years 1987 (Start up) and 2000 (peak production).

The largest increase in average daily traffic would occur along two major routes connecting the tri-city area of Farmington, Aztec, Bloomfield. One route includes segments of New Mexico 44 and New Mexico 57, and the other route is NM 371.

The highways listed in Table 3-5 are the major arteries to access the PRLAs, but other public roads (e.g., county and Bureau of Indian Affairs) are located in the vicinity. The Jicarilla reservation roads could also receive an increase in traffic. The Preference Right Lease Issuance would add about 258 vehicles per day (vpd) to highways in the area by 1987 and about 4,190 vpd by the year 2000. This increase can be compared to the existing average vpd in Chapter 2 (refer to Table 2-11).

Increase noise, air pollution, traffic accidents, road congestion, maintenance and construction, and animal road kills could result from an

TABLE 3-12

TOTAL LAND USE IMPACTS FROM DEVELOPMENT OF SURFACE MINEABLE FEDERAL COAL AT MINE STARTUP (1987) AND PEAK PRODUCTION (YEAR 2000) BY ALTERNATIVE (ACRES)

Alternative	Public Roads			Powerlines			Natural Gas			Proposed Railroad			Total
	1987	2000	Total	1987	2000	Total	1987	2000	Total	1987	2000	Total	
No Action [a]													
Preference Right Lease Issuance [b]	---	31	105	---	26	81	---	16	51	---	12	39	276
Bypass [b]	---	---	---	---	---	---	---	---	13	---	12	---	25
Minimum Surface Owner Conflicts [b]	---	---	---	---	33	96	---	---	---	---	---	5	101
Target [b]	---	3	30	---	68	177	---	24	57	---	---	5	269
High [b]	---	13	141	9	68	354	---	24	66	---	---	5	566

Note: [a] Data not available.

[b] Impacts are attributable solely to this particular alternative and/or action.

TABLE 3-13

TOTAL LAND USE IMPACTS FROM DEVELOPMENT OF UNDERGROUND MINEABLE FEDERAL COAL BY ALTERNATIVE
(ACRES)

Alternative	Public Roads	Powerlines	Natural Gas Pipelines	Proposed Railroads	Total
No Action [a]					
Preference Right Lease Issuance [b]	71	11	21	----	103
Bypass [b]	----	----	----	----	---
Minimum Surface Owner Conflict [b]	33	11	23	27	94
Target [b]	33	11	23	27	94
High [b]	70	78	35	62	245

Note: [a] Data not available.

[b] Impacts are attributable solely to this particular alternative and/or action and are based on analysis by each tract.

increase in traffic. Because most of the rangelands are not fenced, additional traffic on these roads could result in an increase in the number of accidents involving livestock.

The increased number of accidents projected as a result of the additional traffic from mining under this action is listed in Table 3-6. Increases would occur on New Mexico 44 and New Mexico 371 in 1987 and the year 2000.

Coal that is hauled by trucks to loadout facilities, would increase the number of accidents and frequency of road maintenance costs. Maintenance costs could be greater than the revenue collected through regular fees.

SOCIAL AND ECONOMIC FACTORS

Employment

Development under the Preference Right Lease Issuance would generate employment increases in two of the population centers analyzed for the EIS Region (refer to Table 3-14). The employment increase estimates for 1987 range from 18 percent in the Farmington area to 336 percent in Cuba. Estimates for the year 2000 range from the Farmington area's 16 percent to Cuba's 324 percent.

The EIS Region now experiences some unemployment, as do the specific communities associated with this alternative. Based on this fact and the employment needs of the region, it is estimated that 50 percent of the hiring related to the potential mining of the PRLAs and existing leases would be local hires (within the region). The exception to this would be direct employment in underground mining, because special skills are required; a 30 percent local hire figure was used. The balance of the people getting jobs as a result of leasing the PRLAs under this alternative would be in-migrants. These workers and their families would settle in the communities of the region that are closest to the PRLAs in production and that offer desirable services.

Infrastructure (Housing, Community Expenditures, Water Use, Wastewater Systems)

Housing needs would increase in the major communities throughout the region (refer to Table 3-15). An increase of 145 percent is predicted for 1987 in Cuba, and for the year 2000, the projected increase is 128 percent.

Public expenditures were examined by county and by community where figures were available. The source of funding for these expenditures was not analyzed, but a per-capita expenditure was used to determine the required increase in expenditures to maintain current levels of service. These figures are shown in Table 3-16. An increased tax base would be available for most counties.

A required expenditure increase of 175 percent above the baseline was projected for Cuba for 1987. For the year 2000, the projected increase would be 116 percent. Although the mining operations that impact Cuba may not be located in Sandoval County, the Sandoval County tax base would be increased by the additional demand for residential and business properties by mining personnel living in Cuba.

TABLE 3-14

SOCIAL AND ECONOMIC FACTORS--
EMPLOYMENT INCREASES BY ALTERNATIVE

Alternative	Farmington		Cuba		Grants		Gallup		Milan		Crownpoint/Thoreau	
	1987[b]	2000[c]	1987[b]	2000[c]	1987[b]	2000[c]	1987[b]	2000[c]	1987[b]	2000[c]	1987[b]	2000[c]
Baseline	27,440	32,020	1,992[e]	2,154[e]	12,118	17,148	6,700	7,892	1,855	2,630	764	933
Preference Right Lease Issuance [a]	4,973 18%	5,191 16%	1,144 336%	1,731 324%	[d]							
Bypass [a]	Same as Preference Right Lease Issuance											
Minimum Surface Owner Conflicts [a]		3,070 10%			1,644 29%	2,680 33%			1,644 110%	2,680 102%		
Target [a]		5,136 16%	465 149%	773 145%	974 17%	3,172 40%			974 53%	3,172 121%		
High [a]		4,005 13%	468 23%	2,156 100%	1,338 11%	3,807 22%	804 12%	4,454 56%	1,338 72%	3,807 145%	1,806 236%	3,008 322%

Note: [a] Impacts are attributable solely to this particular alternative and/or action. (Percentages cannot be added.)
[b] Figures for each alternative represent only the increase due to coal leasing above the 1987 projected base.
[c] Figures for each alternative represent only the increase due to coal leasing above the 2000 projected base.
[d] No figures represent an increase of less than 10 percent.
[e] Cuba CCD Baseline.

TABLE 3-15

SOCIAL AND ECONOMIC FACTORS--
HOUSING NEED INCREASES BY ALTERNATIVE

Alternative	Farmington		Cuba		Grants		Gallup		Milan		Crownpoint/Thoreau	
	1987[b]	2000[c]	1987[b]	2000[c]	1987[b]	2000[c]	1987[b]	2000[c]	1987[b]	2000[c]	1987[b]	2000[c]
Baseline			314[e]	537[e]		13,516		8,631			668	816
Preference Right Lease Issuance [a]	[d]		454 145%	687 128%	[d]					[d]		
Bypass [a]	Same as PRLA Lease Issuance											
Minimum Surface Owner Conflicts [a]												
Target [a]			183 58%	307 57%								
High [a]			189 60%	946 176%		1,528 11%		1,965 23%			716 107%	1,164 143%

Note: [a] Impacts are attributable solely to this particular alternative and/or action. (Percentages cannot be added.)
[b] Figures for each alternative represent only the increase due to coal leasing above the 1987 projected base.
[c] Figures for each alternative represent only the increase due to coal leasing above the 2000 projected base.
[d] No figures represent an increase of less than 10 percent.
[e] Cuba Village.

TABLE 3-16

SOCIAL AND ECONOMIC FACTORS--
INCREASE IN COMMUNITY EXPENDITURES ($000) BY ALTERNATIVE

Alternative	Farmington 1987[b]	Farmington 2000[c]	Cuba 1987[b]	Cuba 2000[c]	Grants 1987[b]	Grants 2000[c]	Gallup 1987[b]	Gallup 2000[c]	Milan 1987[b]	Milan 2000[c]	McKinley County[f] 1987[b]	McKinley County[f] 2000[c]
Baseline	71,876	83,980	485[e]	829[e]				20,904				3,353
Preference Right Lease Issuance [a]	6,932 10%	[d]	850 175%	962 116%		[d]				[d]		
Bypass [a]	Same as PRLA Lease Issuance											
Minimum Surface Owner Conflicts [a]												
Target [a]		8,410 10%										
High [a]								4,440 21%				397 12%

Note: [a] Impacts are attributable solely to this particular alternative and/or action. (Percentages can not be added.)
[b] Figures for each alternative represent only the increase due to coal leasing above the 1987 projected base.
[c] Figures for each alternative represent only the increase due to coal leasing above the 2000 projected base.
[d] No figures represent an increase of less than 10 percent.
[e] Cuba Village.
[f] Crownpoint-Thoreau data not available.

Most expenditures change from year to year, and revenues can be adjusted by changing property value assessments, taxable values, and mill levies for property taxes, and rates for other types of taxes. Table 3-17 shows severance and property tax revenue increases. It appears that even with some gap between the time population increases occur and the time coal revenues start coming in, the San Juan and McKinley County communities and school districts should be able to meet their financial needs and perhaps have some surpluses. The Sandoval County area (involving the Cuba school district) would likely have increases with little revenue directly from mining.

Table 3-18 shows that water use is expected to increase as population increases, with allocations of water staying at the same levels. The estimated water use increases range from 12 percent in Farmington to 222 percent for Cuba in 1987. Year 2000 increases are estimated between 11 percent in Farmington and 147 percent in Cuba. Perhaps more important than the water use is the water right; Cuba presently is not shown to have a water right allocation. On an annual basis, the City of Aztec, in the Farmington area, has a current use higher than the recorded right.

Table 3-19 shows that the need for sewage treatment capacity would grow with the population, with a 177 percent increased needs in Cuba in 1987. The smaller communities would need to build new capacity. The increased capacity estimated to be needed by the year 2000 is 118 percent for Cuba.

Population increases would affect the availability of all public services provided by local and, to some extent, state government. Taxable valuation, mill levies, and allowable bonded indebtedness are all factors in determining the availability of funds for government services. The percent increase in the level of expenditure required to maintain the current level of infrastructural services has been discussed above.

Local governments are more limited in their ability to assure provision of adequate supplies of housing and health care personnel, which are largely private sector functions. Failure to provide enough new housing of suitable quality and at an affordable price (due to high land and construction costs, restrictive zoning regulations or limitations on new sewer or water hookups) would force many new residents to live in substandard housing or in unplanned trailer settlements on unincorporated lands. From the community standpoint, this situation could result in a loss of potential tax revenues, create obstacles to effective community planning, and make it more difficult to integrate the newcomers into the local political process.

A further decline in the availability of health care facilities and/or personnel would result, at a minimum, in greater inconvenience to residents forced to travel long distance for health care. At worst, it could contribute to an increase in the incidence and severity of health problems among residents, if the latter respond to the inconvenience by foregoing needed health care.

Demography

Table 3-20 shows the population change for the specific alternative and the percent change above the baseline. For 1987, a projected percent increase of 131 was made for Cuba.

TABLE 3-17

ESTIMATED SEVERANCE AND PROPERTY TAX REVENUE INCREASES FROM COAL MINING OPERATIONS, 1987 AND YEAR 2000 BY ALTERNATIVE

Alternative	1987				Year 2000			
	Severance Tax Revenue		Property Tax Revenue		Severance Tax Revenue		Property Tax Revenue	
	($000)	% Increase over Baseline	($000)	% Increase over Baseline	($000)	% Increase over Baseline	($000)	% Increase over Baseline
No Action (Baseline)	28,683	a/	2,621		19,292		1,762	
Preference Right Lease Issuance					14,924	77	1,397	79
Bypass					2,861	15	263	15
Minimum Surface Owner Conflicts					9,718	50	1,384	79
Target	3,507	12	344	13	18,870	98	2,201	125
High	5,893	21	548	21	32,159	167	4,101	233

Note: a/ No figures represent an increase of less than 10 percent.

TABLE 3-18

SOCIAL AND ECONOMIC FACTORS--
WATER USE (ACRE FEET) INCREASE BY ALTERNATIVE

Alternative	Farmington 1987[b]	Farmington 2000[c]	Cuba 1987[b]	Cuba 2000[c]	Grants 1987[b]	Grants 2000[c]	Gallup 1987[b]	Gallup 2000[c]	Milan 1987[b]	Milan 2000[c]	Crownpoint/Thoreau 1987[b]	Crownpoint/Thoreau 2000[c]
Baseline	17,212	20,880	452[e]	770[e]				3,449			1,025	1,286
Preference Right Lease Issuance [a]	2,010 12%	2,285 11%	1,002 222%	1,135 147%	[d]							
Bypass [a]	Same as PRLA Lease Issuance											
Minimum Surface Owner Conflicts [a]												
Target [a]		2,449 12%	305 68%	507 66%								
High [a]		307 68%	1,518 197%					828 24%			923 90%	1,537 120%

Note: [a] Impacts are attributable solely to this particular alternative and/or action. (Percentages cannot be added.)
[b] Figures for each alternative represent only the increase due to coal leasing above the 1987 projected base.
[c] Figures for each alternative represent only the increase due to coal leasing above the 2000 projected base.
[d] No figures represent an increase of less than 10 percent.
[e] Cuba CCD.

TABLE 3-19

SOCIAL AND ECONOMIC FACTORS--
INCREASE IN NEED FOR WASTEWATER TREATMENT (IN 000'S GALLONS PER DAY) BY ALTERNATIVE

Alternative	Farmington		Cuba		Grants		Gallup		Milan		Crownpoint/Thoreau	
	1987[b]	2000[c]	1987[b]	2000[c]	1987[b]	2000[c]	1987[b]	2000[c]	1987[b]	2000[c]	1987[b]	2000[c]
Baseline	13,335	15,580	115[e]	196[e]			1,327				151	185
Preference Right Lease Issuance [a]	1,279 10%		204 177%	231 118%	[d]							
Bypass [a]	Same as PRLA Lease Issuance											
Minimum Surface Owner Conflicts [a]												
Target [a]		1,558 10%	62 54%	103 53%								
High [a]			62 54%	309 158%			331 21%				121 80%	202 109%

Note: [a] Impacts are attributable solely to this particular alternative and/or action. (Percentages cannot be added.)
[b] Figures for each alternative represent only the increase due to coal leasing above the 1987 projected base.
[c] Figures for each alternative represent only the increase due to coal leasing above the 2000 projected base.
[d] No figures represent an increase of less than 10 percent.
[e] Cuba Village.

TABLE 3-20

SOCIAL AND ECONOMIC FACTORS--
POPULATION INCREASES BY ALTERNATIVE

Alternative	Farmington		Cuba		Grants		Gallup		Milan		Crownpoint/Thoreau	
	1987[b]	2000[c]	1987[b]	2000[c]	1987[b]	2000[c]	1987[b]	2000[c]	1987[b]	2000[c]	1987[b]	2000[c]
Baseline			970[e]	1,658[e]	14,314	20,331	21,908	25,808	4,692	6,654	2,500	3,050
Preference Right Lease Issuance [a]			1,271 131%	1,923 116%	[d]							
Bypass [a]	Same as Preference Right Lease Issuance											
Minimum Surface Owner Conflicts [a]					1,827 13%	2,977 15%			1,827 39%	2,977 45%		
Target [a]				859 52%	3,525 17%				1,082 23%	3,525 53%		
High [a]			520 54%	2,573 155%	1,486 10%	4,230 21%		5,481 21%	1,486 32%	4,230 64%	2,006 80%	3,342 110%

Note: [a] Impacts are attributable solely to this particular alternative and/or action. (Percentages cannot be added.)
[b] Figures for each alternative represent only the increase due to coal leasing above the 1987 projected base.
[c] Figures for each alternative represent only the increase due to coal leasing above the 2000 projected base.
[d] No figures represent an increase of less than 10 percent.
[e] Cuba Village.

Table 2-13 shows the ethnic distribution of the 1980 population for the major communities in the EIS Region. Where population is estimated to grow (as it would in 1987 and the year 2000 in Cuba), change in the ethnic mix could bring social changes and changes in the political balance of power.

In the larger cities of the EIS Region such as Farmington, the rapid growth and change associated with the energy boom over the last several years have provided experience with social change. Therefore, further population changes would not have as high a level of impact on the social structure as they would in smaller, less experienced towns. Some increased crime rates and service needs correlated with population increases (particularly with construction and other temporary types of labor) would be felt throughout the impacted areas.

The American Indians (primarily Navajos) nearest the PRLAs and existing leases would experience social changes. Mining would affect their lifestyle, especially the opportunity to use sacred areas, gathering areas for material used in religious ceremonies, and land on which they produce at least a part of their livelihood. These concerns are discussed more specifically in the next section of this chapter.

AMERICAN INDIAN CONCERNS

The type of impacts associated with leasing this action would generally be the same as those identified under the No Action Alternative. The forced relocation of thirty-nine Navajo families from home sites that they have occupied for generations, could result in extensive increases in the measures of mental illness, as it has elsewhere, where Navajos have been relocated. Table 3-21 shows that 49 residences (surface mining), 6 residences (underground mining), 6 known gravesites (surface mining), 5 known gravesites (underground mining), and 4 known sacred sites (surface mining) could be disturbed under this action. Appendices F-1, F-4, and F-5 present analysis by PRLA tract. Total disturbance for this and the No Action Alternative is not known and cannot be adequately projected. This would also include lands that occupants would be relocated on. The impacts would be analyzed when the lands that the individuals would be located on are identified. Lease terms and regulations will be somewhat effective in mitigating these impacts except for those persons unwilling to move to accommodate mining.

PRLA SUBALTERNATIVE 1: ALTERNATIVE LEASE TERMS

The Mineral Leasing Act allows the Bureau to place terms and conditions into leases in order to protect the interests of the United States and to safeguard the public welfare. This authority allows measures necessary or desirable to protect the environment or to mitigate other adverse effects of coal development. The Bureau must condition leases as necessary to carry out the results of the federal lands review mandated by the Surface Mining Control and Reclamation Act. In addition, the Bureau must condition each lease to ensure consistency with federal land-use planning. The proposed action would include in each lease a comprehensive set of lease terms and conditions, covering all resources and providing some socioeconomic mitigation measures (refer to Appendices I-1 and I-2). These terms would be applicable both to proposed competitive leases and also to leases issued to PRLA holders.

TABLE 3-21

IMPACTS ON AMERICAN (NAVAJO) INDIANS BY ALTERNATIVE AND TYPE OF MINING

Alternative	Relocation/Disturbance								
	Residences			Known Gravesites			Known Sacred Sites		
	Surface	Underground	Total	Surface	Underground	Total	Surface	Underground	Total
No Action [a]									
Preference Right Lease Issuance [b]	49	6	55	6	5	11	4	0	4
Bypass [b]	4	0	4	3	0	3	1	0	1
Minimum Surface Owner Conflict [b]	3	20	23	0	0		0	0	0
Target [b]	50	20	70	23-33	0	23-33	3	0	3
High [b]	345	110	455	25-35	0	25-35	3	1	4

Note: [a] Data not available.
[b] Impacts are attributable solely to this particular alternative and/or action and are based on analysis for each tract.

The Bureau could choose lease terms and conditions other than those it is currently proposing. The section entitled "Alternative Mitigating Measures " describes alternative lease terms and stipulations and considers their environmental effects. The general effect of the alternative terms and conditions would be to reduce the environmental effects of coal mining. Some of the alternative terms and conditions have been suggested by the Bureau, some of the State of New Mexico, some by other federal agencies, and some by the public.

PRLA SUBALTERNATIVE 2: EXCHANGE OR LEGISLATION

If the Bureau determines that a PRLA holder discovered coal in commercial quantities during the term of a prospecting permit, the holder has a right to a lease, and the Bureau has no general discretion to reject the PRLA on environmental or any other grounds. Once the Bureau makes the determination, mining can be prevented if:

(1) The lessee is unable to submit a permit application which complies with the applicable requirements of the Surface Mining Control and Reclamation Act, or other applicable legal requirements; or

(2) The lessee voluntarily agrees to exchange his lease rights for coal bidding rights, or leases for sodium, sulphur, potassium, or phosphate; or

(3) The Congress passes legislation which requires the relinquishment of the PRLA rights in exchange for other leases, bidding rights, or cash; or

(4) The Secretary determines that coal development would not be in the public interest and the Secretary issues a certificate of bidding rights instead of a lease.

(5) A market is not developed before the expiration of the diligent development period.

This section considers the environmental effects of two subalternatives which would result in the elimination of mining for all or some of the PRLAs. Each subalternative could be carried out by exchange, with the PRLA holders' agreement, or by legislation. The environmental effects of proceeding one way or the other are not significant. Because of the Secretary's somewhat limited coal lease exchange authority, it is possible that any of these subalternatives could require legislation.

Each of the exchange subalternatives would have a similar effect: the mining of coal within the area covered by the relinquished rights would not occur, and the site would remain as described in the no-action alternative. The coal would remain available for mining in the future under competitive coal leasing provisions. If the PRLA holder received lease rights or coal bidding rights, the impacts from mining could occur elsewhere. The exact nature of the rights that would be received and the environmental effects from the granting of those rights are so speculative and remote that further analysis cannot be made now. This information is not essential for a reasoned decision on whether exchanges should be pursued since the availability of lands suitable for an

exchange can be reasonably assumed to exist. These lands would not necessarily be in the San Juan Basin.

a. Total Exchange or Legislation

If issuance of the PRLAs is found to be not in the public interest, all PRLA lease rights would be exchanged or otherwise transferred. This would eliminate all of the environmental and social effects of coal mining on the subject tracts as well as all of the economic benefits including increased state revenues. The no-action alternative should be compared with the discussion of the effects of leasing the PRLAs to determine the effects of this proposal. Any coal production in the Region would have to come from existing coal production sources or from new competitive tracts.

Because the PRLAs contain approximately one-half to two thirds of the Region's surface mineable coal deposits, replacement coal of the same value will be difficult to obtain since most of the coal is obligated. This alternative presents a potential for reducing the overall coal production levels that could be achieved in the Region, thereby lowering the potential for cumulative disturbance of all resources, availability of services and the potential for economic benefits through increased tax revenues and employment. The main benefit of this subalternative would be to direct coal development away from the areas of highest paleontological, cultural, and socioeconomic conflict to areas of less conflict. This subalternative could greatly diminish the overall viability of the area for increased employment, development, and standard of living.

b. Exchange or Legislation for Selected PRLAs

Under this subalternative, the Bureau would pursue exchanges or other extinguishment of PRLA rights for particular PRLAs which present significant or unusual environmental effects. Numerous possibilities exist; several specific possibilities are presented as examples of the available subalternatives. Other choices are possible, but additional analysis is not essential to the decision-maker at this time.

The following discussion summarizes the impacts of example 1 and 2 of the Partial PRLA Lease Issuance subalternative. The approximate TSP concentration would be 100 ug/m^3 for 24 hours. The New Mexico State TSP 24-hour ambient air quality standard is 150 ug/m3. Therefore, the standard would not be exceeded.

An estimated 1,076 fossil localities would be destroyed by surface mining. Population increases and increased access to the region would result in unauthorized collection and vandalism. During subsurface mining some information would become available.

Approximately 15,435 acres of vegetation, soils, topography, and wildlife habitat would be temporarily disturbed by surface mining with short-term acceleration of erosion and sedimentation. Approximately 515 acres could be removed from production by facilities construction, resulting in long term productivity loss. Soil mixing, contamination and compaction would occur.

There would be some subsidence on approximately 28,270 acres. About 1.02 billion tons of coal would be removed.

Approximately 12,275 acre feet of water per year used during the mining process. The existing surface drainage patterns would be disturbed. There would also be disruption of aquifers and destruction of shallow ground water sources.

An estimated 1,778 AUMs would be lost. Vegetation should return to or near full production in the long term.

Approximately 434 cultural resource sites are predicted. Site excavations and data recovery prior to mining would result in increased knowledge of the area. Unmitigated or unknown sites and Chaco roads in surface mined areas would be destroyed.

Mining would reduce the scenic values on a total of 15,435 acres. The exchange of leases from wilderness study areas would slightly improve the wilderness experience in De-na-zin WSA. In Ah-shi-sle-pah the wilderness qualities would be preserved. An unknown number of acres of rights-of-ways would be removed or relocated, these rights-of-ways include roads, powerlines, and transmission lines.

Traffic accidents would increase by more than 89 and average daily traffic by more than 4,190 in the year 2000. There would be a need for more road maintenance and construction.

Population would increase by 1,923 people (116%) in Cuba in the year 2000. Employment would increase by 5,191 jobs (16%) in Farmington and 1,731 jobs (324%) in Cuba in the year 2000. Lifestyles and cultural and religious values for Navajo, people living on or near the PRLA's would be disrupted. Expansion of community infrastructures would be necessary. Fourteen Navajo families occupying the PRLA area and adjacent land would be relocated.

On 11 known gravesites the lessee would have to get permission to move the gravesites or an area 100 feet surrounding the site could not be mined. The unknown gravesites could be destroyed if not identified.

Four known sacred sites would be destroyed or would need ceremonies performed to mitigate the impacts to them. Unknown sites could be destroyed by surface mining.

1. Exchange or Legislation for PRLAs with Navajo Occupancies

PRLAs NM 585 (7 residences), 3918 (11 residences), 6801 (6 residences), 8128 (14 residences), 8130 (12 residences), 8715 (2 residences) and 8717 (3 residences) for a total of 55 Navajo residences (see Visual D, Appendix F1, Draft EIS) which could be affected by PRLA development. The Navajo Chapter Houses (Nageezi, Pueblo Pintado, and Ojo Encino) in the area of these PRLAs have expressed opposition to coal leasing, as have many Navajos who have testified or commented to the Bureau. This subalternative evaluates the effects of not developing the PRLAs that are covered in whole or part by Navajo occupancies or residences. These PRLAs contain approximately 22,000 acres of land,

approximately 10,000 acres of which is either Indian land, or withdrawn for the use of Indians.

The effect of this subalternative would be to prevent the mining on portions of these tracts and all attendant environmental and socioeconomic effects. A summary of the major resources on each of these PRLAs can be found in Appendix A-6 of this document. In addition, it is possible that this subalternative would also prevent or make more difficult coal mining on adjacent lands.

The main benefit to this alternative would be to eliminate a major conflict between the Navajos living in the area and coal production. The conflict exists partly because current laws exempt PRLAs from the surface owner consent provisions of the Surface Mining Control and Reclamation Act. However, it does not preclude surface occupants from receiving compensation for surface damages or losses.

This means that landowners over PRLAs have no legal right to veto the issuance of these leases as they would over competitive leases if they were "qualified surface owners." Under the proposed action, owners of occupied dwellings on trust surface allotments or homesteads could prevent mining within 300 feet of the dwelling or could waive that right in writing. In addition, the landowners over coal in PRLAs must either consent to mining of lands they own or force the lessee to post a bond covering damages mining will cause to the land.

The combination of these protections may result in significant financial benefits to the persons living on the actual leases issued to the PRLA holders and gives a reasonable level of protection. To some, the financial payments and limited surface protection for dwellings may not be adequate to compensate for the disruption in their personal lives or the disruption in the lives of their relatives in the area. No payments are required to be made to adjacent off-lease residents. Exchanges or similar measures would prevent this disruption, as well as preserve the physical resource values on the lands.

The main drawback to this subalternative is the elimination of the availability for mining of coal reserves and the attendant economic benefits of the production. This includes the possibility of very considerable economic benefits to the allotment owners and others living over the coal. These benefits could range up to 2 or 3 percent of the value of the coal sold.

This alternative would not affect the availability of coal which could be offered through competitive leasing, or coal production on other existing coal sources. It may have an effect on the decision to build the leg of the Star Lake Railroad from Gallo Wash to Star Lake, since PRLAs NM 585, 8128, 8130, 8175 are all in that area. The adverse affects on coal development of this subalternative could be lessened by exchanging smaller parts of the PRLAs such as a 40-acre protection zone for residences; this might, however, cause such serious disruption to logical mining units that coal production would still be hindered greatly.

2. Exchange or Legislation for PRLAs with Special Paleontological Values and the Ah-shi-sle-pah WSA

Parts of three PRLAs, NM 3918, 3919, and 6804, are within the Ah-shi-sle-pah WSA. Parts of NM 3752 and 3753 are within the area known as the "Fossil Forest." Both contain areas of high values for paleontological resources (refer to Chapter 2 Paleontology Resources). The Bureau's current proposed action would allow mining in Ah-shi-sle-pah if Congress decides not to make the land a part of the National Wilderness Preservation System and would not allow mining in the Fossil Forest up to a 10-year period of scientific study (September, 1991).

Under this subalternative, the Bureau could pursue exchange or other extinguishment of the PRLA rights to preserve the wilderness and paleontological values of these lands.

The effect of this subalternative is to retain these lands in their current status to allow prolonged, periodic scientific study of the lands. The subalternative would also make unavailable for mining over 350 million tons of coal and would not require the intensive premining study of the paleontological resources of these areas, and the attendant gain in scientific knowledge from this study.

Designation of the Ah-shi-sle-pah WSA as a wilderness area would result in specific management actions and plans to preserve the qualities within the WSA boundaries. Management emphasis would be on preserving the visual, paleontological, recreational (sightseeing, hiking, etc.) and cultural resources. Mineral development, grazing, rights-of-ways, etc. may be allowed only within the limits allowed under wilderness management.

Non-designation of the Ah-shi-sle-pah WSA would result in a resumption of multiple-use management. Mineral development could become the primary short-term use of the area for PRLAs issued within WSA boundaries. Recreational, paleontological, cultural and grazing uses would resume upon completion of PRLA mining or if leases are not issued for PRLAs. Specific details for management of the area (wilderness and nonwilderness) are listed and analyzed in the Proposed Wilderness Areas Environmental Impact Statement (BLM, 1982).

Protection of the Fossil Forest Area may also affect the efficient recoverability of coal in areas adjacent to the Fossil Forest as those lands appear to be in the middle of a logical mining unit consisting of PRLAs NM 3752, 3753, and 3754. The paleontological community has been given an extensive opportunity to discuss whether the Fossil Forest should be protected. There appears to be a majority with the opinion that study followed by mining is adequate, while other paleontologists contend that the values are sufficiently unique that only in situ protection would be adequate. The proposed action reflects the view of those who believe that study is adequate; the subalternative reflects the view of those who believe in situ protection is required.

COMPETITIVE COAL LEASE ISSUANCE

No Action for the competitive leasing proposals assumes lease issuance and development of all 26 PRLAs. Refer to the Preference Right Lease Issuance for analysis of the impacts.

IMPACTS-BYPASS ALTERNATIVE

This alternative proposes to offer for lease eight competitive tracts all of which would be surface mined. These eight tracts are located next to existing and proposed mines and PRLAs (refer to Table 1-3), and it is assumed that the tracts would not be mined but would be bypassed unless adjacent mining operations extend into them.

Federal in-place reserves that would be leased total approximately 129 million tons, of which 113 million tons would be recoverable. Projected average annual coal production would be approximately 2.26 million tons from 1985 through the year 2007 for seven of the eight tracts.

AIR QUALITY

The impacts would generally be of the same type as those identified under the No Action Alternative, and Preference Right Lease Issuance but a larger area would be affected. The total emissions under this alternative would be 6,196 tons of TSP per year. Table 3-1 shows that for this alternative, under worst-case meteorological conditions, the New Mexico State 24-hour standard of 150 ug/m^3 would be exceeded by 13 ug/m^3, with a TSP level at the mines of 163 ug/m3. This level is an increase of 63 ug/m3 over the No Action Alternative and Preference Right Lease Issuance and could exceed the Class II 24-hour PSD limit in the vicinity of the mines. The areal extent of the impacts would generally be limited to short distances from the tract boundaries and federal ambient standard would not be exceeded.

The visual range would be reduced to 65 miles from 73 miles.

The impact of this alternative on air quality is considered significant on a 24-hour basis in the local area of the mines. This impact would not occur all the time. The frequency that the mines exceed the 24-hour standard has not been determined. Frequency is influenced by mine emissions, i.e. acres disturbed, tons of coal mined, and haul road traffic (volume and speed) and atmospheric conditions, i.e. number of days receiving moisture, atmospheric stability, mixing heights, and inversions.

TOPOGRAPHY AND MINERAL RESOURCES

The type of impacts associated with this alternative would generally be the same as those identified under the No Action Alternative. Table 3-2 shows that under this alternative, approximately 364 and 1,342 acres would be

disturbed in 1987 and the year 2000, respectively. A total of 6,130 acres would be disturbed by mining, of which 600 acres would be for surface facilities. Total acreage disturbed under this, the No Action Alternative, and Preference Right Lease Issuance would be 53,150 acres, this represents less than 1 percent of the EIS region. Impacts to construction materials (sand and gravel) would be of the same type as discussed in the No Action Alternative.

PALEONTOLOGY

The type of impacts associated with this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-3 shows that under this alternative, an estimated total of 271 fossil localities would be disturbed. The total number of fossil localities disturbed for this, the No Action Alternative and Preference Right Lease Issuance would be 2,508.

SOILS

Table 3-22 shows that mining facilities (structures, haul roads, storage areas, buildings, and parking areas) would cause the permanent loss of approximately 39 acres of the soil resource. A total of approximately 6,130 acres would be disturbed by eight surface mines. Annual surface disturbance from mining activities under this alternative would consist of approximately 417 acres per year. Surface disturbance at the onset of mining activities (1987) would include approximately 494 acres, and approximately 831 acres of surface disturbance would occur during peak production by the year 2000. Total acreage disturbed for this, the No Action Alternative and Preference Right Lease Issuance would be 53,150 acres (refer to Table 3-2). This represents less than 1 percent of the EIS region.

Removal of vegetation cover would expose barren soil to wind and water action during stripping operations and stockpiling. Soil would be lost as levels of sedimentation and suspended dust particles increase.

Contamination of topsoil and subsoils may occur during surface mining operations. Accidental spills of toxic materials such as oils, chemicals, and waste materials may cause soil contamination. Contamination may also occur because of toxic and nutrient-deficient materials found within spoil piles, overburden and bedrock material.

Soil stability would be disrupted and changed. Stripping operations, handling, and stockpiling would cause a loss of soil fertility by the introduction of inferior subsoils and the biological death of soil micro-organism. This would reduce soil productivity. Surface mining activities would alter soil structure, causing changes in the soil-water regime. This action would affect water infiltration and permeability rates and the ability of the soil to hold water. Changes in the soil-water regime would limit plant growth.

Surface mining operations would cause compaction, resulting in lower permeability and infiltration rates. Handling, transporting, and stockpiling of soils would also cause compaction and mixing of various-textured soils and horizons. These activities may change bulk density and create different soils. Disturbances to soils would create significant impacts to paleontological and cultural resources, as discussed in those sections under this alternative.

TABLE 3-22

SOILS IMPACTS BY ALTERNATIVE

Alternative	Acres/Soil Disturbed		Acres Surface Reclaimed/Revegetated		Number Tracts Involved with Reclamation		Total Acres Permanently Lost	
	1987	2000	1987	2000	1987	2000	1987	2000
No Action [a]								
Preference Right Lease Issuance[a]								
Bypass	494	831	47.5	127	2	2	39.42	39.42
Minimum Surface Owner Conflicts	638	2,180	40	435	3	4	39.0	39.0
Target	1,762	4,417	48	914	2	12	78.42	78.42
High	3,697	8,559	40	1,522	1	14	78.42	78.42

Note: [a] These figures are not available for the year 1987 and 2000.

Projected reclamation potential discussed in the No Action Alternative is expected to be similar under this alternative.

WATER RESOURCES

Surface water

The general impacts on surface water caused by the Bypass alternative actions are the same as those described for the No Action Alternative. The nature of the impacts do not change; the magnitude of the impact is proportional to the amount of surface area disturbed. During mining and reclamation, the larger the area disturbed, the less the area contributing surface runoff and the larger the decrease in streamflow and sediment. The larger the area successfully reclaimed, the greater the reduction in sediment yield and streamflow. Increases in the number of mining operations may increase the possibility of accidental contamination of surface water and of failure of impoundments and diversion structures.

Ground Water

The impacts associated with leasing this alternative will generally be the same type as those identified under Preference Right Lease Issuance. The Entrada Sandstone (Layer 1) and Westwater Canyon Member of the Morrison Formation (Layer 3) would be the only aquifers impacted by additional pumping and coal development under this alternative. A maximum additional drawdown (over and above that caused by Preference Right Lease Issuance) of 30 feet in the Entrada would occur between the years 2026 and 2030. A maximum additional drawdown of 10 feet in the Westwater Canyon Member would occur between the years 1996 and 2015. Plate 2 (enclosed with the Draft EIS) shows the maximum differences between projected drawdowns of the No Action Alternative, Preference Right Lease Issuance and the Bypass Alternative, and the time period during which those maximums would occur. The maximum additional drawdowns and the years in which they would occur are summarized in Table 3-23. Total water needs for this, the No Action Alternative and Preference Right Lease Issuance would be approximately 16,830 acre-feet of water per year.

VEGETATION/LIVESTOCK GRAZING

Table 3-4 shows that the Bypass Alternative would remove approximately 6,130 acres of native vegetation and 603 AUMs of livestock forage on BLM and BIA administered allotments over the life of the mines or until reclamation takes place. This represents .2 percent of the AUMs in the Chaco Planning Unit (refer to Map 3-1). In addition, four reservoirs, 2 miles of fence and a well would be destroyed by surface mining. By the start of production in 1987, there would be 494 acres of native vegetation removed and 43 AUMs of forage temporarily lost. At the peak of mining in the year 2000, there would be 897 acres of vegetation removed and 82 AUMs of forage. Five allotments out of the 105 allotments administered by the BLM and BIA in the Chaco Planning Unit (5%) and 21 allottees out of 2,243 allottees (1%) would lose a portion of or all of the AUMs available because of mining the tracts under this alternative. The total disturbance for this, the No Action Alternative and Preference Right Lease Issuance would be to 53,150 acres, 5,801 AUMs, 14 reservoirs, 23 miles of fence, 5 wells, 3 cattleguards, and 2 corrals, this represents 1.8 percent of the AUMs in the Chaco Planning Unit.

TABLE 3-23

MAXIMUM ADDITIONAL DRAWDOWNS IN MAJOR AQUIFERS OF THE SAN JUAN STRUCTURAL BASIN UNDER THE COMPETITIVE LEASING ALTERNATIVES
(see Plate 2, enclosed in the Draft EIS)

Alternative[a/]	Aquifer	Maximum Drawdown (Feet)	Year of Occurrence	General Area(s) of Occurrence
Bypass	Entrada Sandstone	30	2026-2030	Southern and Central Basin
	Westwater Canyon Member	10	1996-2015	Central Basin
Minimum Surface Owner Conflicts	Entrada Sandstone	30	2031-2035	Southern and Central Basin
	Westwater Canyon Member	100	2021-2025	Central Basin
	Gallup Sandstone	300	1996-2005	Lee Ranch Area of Basin
Target	Entrada Sandstone	70	2026-2035	Southern and Central Basin
	Westwater Canyon Member	100	2021-2025	Central Basin (more extensive cone of depression for drawdowns in range of 1 to 70 feet).
	Gallup Sandstone	300	1996-2005	Lee Ranch area of basin (more extensive cone of depression for drawndowns in range of 10 to 70 feet).
High	Entrada Sandstone	70	2026-2035	Southern and Central Basin (slight further outward spread of 10 and 30 foot drawdown contours).
	Westwater Canyon Member	100	2021-2025	Central Basin
	Gallup Sandstone	300	1996-2005	Lee Ranch area of basin (slight further outward spread of cone of depression).

Note: a/ The figures on this table are over and above those in Preference Right Lease Issuance.

WILDLIFE

Mule Deer and Elk

During mining under this alternative, 60 to 100 mule deer and six to twelve elk of a larger herd would be subjected to disturbance associated with all phases of mining activity. No deaths are expected to occur to these animals as a result of mining. It is possible that some poaching would occur as a result of the mines being in the area of deer winter range. However, hunter success during the regular deer season would not be significantly affected because of poaching or because of the loss of deer winter range. All 200 acres of this tract would be unsuitable for big game until reclamation is completed, then positive effects would be expected with big game concentrating on seeded areas. Reclaimed areas would possibly attract more animals than the natural habitat could support. This 200 acres represent about one percent of the winter range occupied by this herd.

Species of High Federal Interest

Increased human activity associated with mining under this alternative would have the same type of impacts on migrating, wintering and nesting prairie falcons, ferruginous hawks, and golden eagles that would occur under the No Action Alternative and Preference Right Lease Issuance. Similar impacts would be expected in 1987 from mining on 160 acres of the Bisti #4 Tract. An additional 200 acres mined on the Bisti #4 Tract by the year 2000 would result in similar or possibly increased disturbance depending on the proximity of mining to nest sites. Table 3-9 shows that the total number of nests of species of high federal interest that could be disturbed by this the No Action Alternative and Preference Right Lease Issuance would be 1 prairie falcon, and 6 ferruginous hawks.

CULTURAL RESOURCES

Table 3-10 shows that for this alternative, 28 sites have been recorded on the portions of the tracts containing federal coal or surface, and between 165 and 188 are predicted to occur. They would be destroyed by surface mining unless avoided and left intact. Utilizing the predicted site density for each tract, the number of sites that may be destroyed at mine start-up (1987) and peak production (2000) has been estimated. Between 19 and 20 sites may be destroyed in 1987, and between 26 and 78 in the area of surface disturbance in the year 2000. Total disturbance for this the No Action Alternative and Preference Right Lease Issuance would be to 199 recorded sites and between 1,148 and 1,680 predicted sites.

A probable segment of the Chacoan road system crosses the Hospah #1 tract and may cross Bisti #4 tract. The Chacoan Road study mitigated most of the road segments through testing and study. If new roads are found they would also be studied, if not they would be destroyed.

Additional sites outside of the coal lease tracts including Chacoan outliers designated as Archeological Protection Sites in P.O. 96-550, may be disturbed or destroyed by mine associated activities, unauthorized collection or vandalism with the increased population in the EIS region, thus limiting the scientific data available from the sites.

Five tracts are within 10 miles of Chaco Culture National Historical Park. Vibrations from blasting or other mining related activities may affect the stability of standing walls within the park.

The Advisory Council on Historic Preservation has listed actions that may cause adverse affects to cultural resources. They include: (1) destruction or alteration of all or part of a property, (2) isolation from or alteration of its surrounding environment, or (3) introduction of visual, audible or atmospheric elements that are out of character with the property or its setting (36 CFR 800.9). The damage or destruction of cultural sites from mining activities would result in the following losses: (1) scientific and cultural information for future research, (2) resources that may be valuable in terms of uniqueness in their natural setting, (3) buried, unsalvaged sites, and (4) sites important for social or religious reasons to native Americans. The loss of some of these values would be partially offset by information gained through implementation of the mitigation plan. Such information would add to the growing data base for cultural resources in northwest New Mexico.

The National Register of Historic Places eligibility of the 28 recorded sites has been determined through consultation between the BLM and New Mexico State Historic Preservation offices. Twenty-five of the sites have been recommended as eligible while three were recommended as ineligible. Before the mine plan is prepared an intensive cultural resources inventory of the portions of the lease tract, or portions of the mine plan area and adjacent areas that may be affected by lease related activities will be conducted. The National Register eligibility of all located sites will be determined. All sites on Federal lands found eligible will be addressed in a mitigation plan. Mitigation treatment for sites within the affected area may vary from data extraction to preservation in place. All cultural resources will be afforded the protection they are guaranteed through state and federal laws/regulations, and all mine lease stipulations.

VISUAL RESOURCES

The type of impacts associated with this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Under the Bypass Alternative, all tracts are in either VRM Class III or IV, except for the La Plata Tract, which is not classified. Surface mining and facilities on these tracts would alter the visual landscape to a degree unacceptable in their present classes.

Surface mining of two tracts, Bisti #4 and Bisti #6, would cause significant visual impacts. Bisti #4 is in an area known as the "Fossil Forest" which has good sightseeing values. Surface mining would destroy this quality. Bisti #6 is also in a scenic badlands area, and part of the tract is near the Bisti Wilderness Study Area. Mining would destroy the scenic quality of the tract as well as cause a visual distraction to the scenic resources nearby for the life of the mine.

Visual B (enclosed in the draft EIS) displays the VRM classes on those lands affected by mining operations as a result of additional federal coal leasing. No VRM Class II lands would be directly impacted as a result of additional leasing under the Bypass Alternative.

WILDERNESS

Under this alternative, surface mining of Bisti #6 would have the same type of impacts as described for existing leases under the No Action Alternative and Preference Right Lease Issuance. Impacts would be more noticeable on the parts of the tract closest to the Bisti Wilderness Study Area (WSA). Some disturbance can be expected in 1987, but mining of this tract should be completed before the year 2000.

RECREATION

Under this alternative, mining-related population growth would increase dispersed recreation demand in the EIS Region. Mining operations would decrease the amount of public land available, resulting in additional pressures on the remaining lands. Impacts would include increased litter, vandalism, and ORV use, as discussed for the No Action Alternative and Preference Right Lease Issuance.

Surface mining of the Bisti #6 Tract would destroy the scenic quality of that tract and detract from the recreational experience in the nearby Bisti management area.

Mining of certain tracts would detract from the solitude, serenity and other specific recreation resources due to noise and visual effects that would reduce the quality of the recreational experience, while some recreation resources could be destroyed. Acres not available for recreation are shown in Table 3-11.

Surface mining of the Bisti #4 Tract would destroy part of the scenic recreation area known as the Fossil Forest. The Star Lake West #2, Gallo Wash #1, and Hospah #1 tracts are within the corridor being studied for possible placement of the Continental Divide National Scenic Trail (CDNST). Surface mining of these tracts could disrupt actual trail location and aesthetics.

LAND USES (Roads, Railroads, Pipelines, Transmission Lines)

The type of impacts associated with this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-12 shows that under the Bypass Alternative, 13 acres of rights-of-way for natural gas pipelines would be disturbed by relocation or removal. Total disturbance under this the No Action Alternative and Preference Right Lease Issuance would be 105 acre of rights-of-way for public roads, 81 acres for powerlines, 64 acres for natural gas pipelines, and 39 acres for proposed railroads.

TRANSPORTATION

The type of impacts associated with mining under this alternative would generally by the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-5 shows predicted increases in car and light duty truck traffic. A traffic increase would occur on New Mexico 371

by 1987. By the year 2000, traffic increases would occur on New Mexico 44, New Mexico 197, and New Mexico 371.

Two competitive lease tracts under this alternative would require transportation other than the Star Lake Railroad. Due to the location of the La Plata #1 Tract north of Farmington, coal would have to be trucked to power plants (probably west of Farmington) as is currently being done with coal mined from the La Plata mine. If the La Plata transportation corridor is constructed, coal will be transported via the corridor instead of Highway NM-170 and NM-550 west of Farmington.

The projected increase in number of accidents due to this alternative is shown on Table 3-6. By 1987, an increase would occur on New Mexico 371. By the year 2000, accident increases would also occur on New Mexico 44.

SOCIAL AND ECONOMIC FACTORS

Construction, production, and transportation workers on adjacent mines would be utilized for the mining operations on the tracts in the Bypass Alternative. Therefore, the type and extent of impacts associated with leasing this alternative would be the same as those identified under the Preference Right Lease Issuance.

AMERICAN INDIAN CONCERNS

The type of impacts associated with leasing this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-21 shows that 4 residences (surface mining), 9 known gravesites (surface mining), 5 known gravesites (underground mining), and 5 known sacred sites (surface mining) could be disturbed under this alternative. Total disturbance for this, the No Action Alternative and Preference Right Lease Issuance would be 53 residences (surface mining), 6 residences (underground mining), 9 known gravesites (surface mining), 5 gravesites (underground mining), and 5 known sacred sites (surface mining).

IMPACTS-MINIMUM SURFACE OWNER CONFLICTS ALTERNATIVE

The Minimum Surface Owner Conflicts Alternative was selected on April 27, 1983, by the Regional Coal Team as the preferred alternative subject to further evaluation by the State of New Mexico or the identification of minimal environmental, social and economic imapcts. It is not necessarily that of the Secretary's, nor does it bind the Secretary in any way in reaching a final federal leasing decision. This alternative proposes to lease 11 tracts. Six of the tracts would be surface mined, and five would be underground mined. Federal in-place reserves that would be leased are approximately 916 million tons, of which 349 million tons are recoverable. Projected average annual coal production would be approximately 7.15 million tons from 1985 through the year 2007 for 9 of the 11 tracts. It appears that minimal conflicts regarding mining would occur with the surface owners of these tracts with some consent having been filled.

AIR QUALITY

The type of impacts associated with this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-1 shows that for this alternative, under worst-case meteorological conditions, the New Mexico State 24-hour standard of 150 ug/m^3 would be exceeded by 84 ug/m^3 with a TSP level at the mines of 234 ug/m^3. The 234 ug/m^3 was obtained by modeling the mines from this, the No Action Alternative and PRLAs.

The total emissions from mining under this alternative would be 16,183 tons of TSP per year. The visual range near the mine boundaries would be reduced to 60 miles from 73 miles. The areal extent of the impact is generally limited to short distances from the lease area boundaries.

TOPOGRAPHY AND MINERAL RESOURCES

Surface Mining

The type of impacts associated with this alternative will generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-2 shows that for this alternative, approximately 308 and 4,988 acres would be disturbed in 1987 and the year 2000, respectively. A total of 19,302 acres would be disturbed by mining, of which 1,050 acres would be for surface facilities. The total acreage disturbed for this, the No Action Alternative and Preference Right Lease Issuance would be 66,327 acres, this represents less than 1 percent of the EIS Region.

Underground Mining

Subsidence impacts would remain the same as discussed under the No Action Alternative and Preference Right Lease Issuance.

Surface facility construction would cause permanent changes of natural topography on about 400 acres.

Underground hazards and impacts to mineral development would remain the same as discussed in the No Action Alternative and Preference Right Lease Issuance. Oil and gas potential exists in the area; drilling for these commodities could conflict with coal development.

PALEONTOLOGY

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-3 shows that for this alternative, an estimated total of 136 fossil localities would be disturbed. The estimated total of fossil localities disturbed for this, the No Action Alternative and Preference Right Lease Issuance would be 2,373.

SOILS

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-22 shows that mining facilities (haul roads, structures, storage areas, buildings, and parking areas) would cause the permanent loss of approximately 39 acres of the soil resource. Approximately 19,302 acres of disturbance would be associated with six surface mines (510 acres per mine per year), and about 400 acres of surface disturbance with five underground mines. Surface disturbance at the onset of mining activities (1987) would consist of about 638 acres. Approximately 2,180 acres of surface disturbance would occur during peak mine production (year 2000). The total acreage disturbed by this and the No Action Alternative would be 66,322 acres (refer to Table 3-2).

A maximum of 80 acres per underground mine would sustain surface disturbance in the form of access roads, parking areas, storage yards, buildings, utilities, and mine structures. Surface structures and facilities associated with underground mines would result in vegetation removal and soil disturbance and thus susceptibility to wind and water action. Sediment rates would increase slightly because of vegetation removal and unstable soils, and the placement of mine structures and facilities would cause some soil compaction. Soil characteristics and properties (bulk density, permeability, productivity, potential, structure, infiltration rates, and micro-organisms) would be affected to some extent because of soil handling, transporting, and stockpiling. Soil contamination may occur because of accidental spills (man-made products) and toxic material from disturbed soils, bedrock, and spoil piles.

Projected reclamation potential discussed in the No Action Alternative is expected to be similar under this alternative.

WATER RESOURCES

Surface Water

The general impacts on surface water caused by this alternative are the same as those described for the No Action Alternative. The nature of the impacts do not change; the magnitude of the impact is proportional to the amount of surface area disturbed. During mining and reclamation, the larger the area disturbed the less the area contributing surface runoff and the larger the decrease in streamflow and sediment. After mining, the larger the area successfully reclaimed the greater the reduction in sediment yield and streamflow. Increases in the number of mining operations may increase the possibility of accidental contamination of surface water and of failure of impoundments and diversion structures.

Ground Water

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance (Plate 1 enclosed in the Draft EIS). Additional coal development and pumping under this alternative would impact the

Entrada Sandstone (Layer 1), Westwater Canyon Member of the Morrison Formation (Layer 3), and Gallup Sandstone (Layer 5). Maximum drawdown (over and above that caused by Preference Right Lease Issuance) in the Entrada would be 30 feet, occurring between the years 2031 and 2035. Additional maximum drawdown in the Westwater Canyon Member would be 100 feet, occurring between the years 2021 and 2025. Additional maximum drawdown in the Gallup Sandstone would be 300 feet, occurring between the years 1996 and 2005 in the vicinity of the Lee Ranch Tracts. The maximum additional drawdowns and the year in which they would occur are summarized in Table 3-23, and shown on Plate 2 (enclosed in the Draft EIS). Total water needs for this, the No Action Alternative and Preference Right Lease Issuance would be approximately 18,950 acre-feet of water per year.

VEGETATION/LIVESTOCK GRAZING

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-4 shows that the Minimum Surface Owner Conflicts Alternative would remove approximately 19,302 acres of native vegetation and 4,268 AUMs of livestock forage on BLM and BIA administered allotments over the life of the mines or until reclamation is completed. This represents 1.3 percent of the AUMs in the Chaco Planning Unit (Map 3-1). In addition, nine reservoirs, 13 miles of fence, six wells and a spring would be destroyed by surface mining.

By the start of production in 1987, 638 acres of native vegetation would be removed and 114 AUMs of forage temporarily lost. At the peak of mining in the year 2000, 2,180 acres of vegetation would be removed with 455 AUMs of forage. Five allotments out of the 105 allotments administered by the BLM and BIA in the Chaco Planning Unit (5%) and 27 allottees out of 2,243 allottees (1.2%) would lose a portion of or all of the AUMs available because of mining the tracts under this alternative. The total disturbance for this, the No Action Alternative and PRLAs would be to 66,322 acres, 9,466 AUMs, 19 reservoirs, 34 miles of fence, 10 wells, 3 cattleguards, 2 corrals, and 1 spring. This represents 3 percent of the AUMs in the Chaco Planning Unit.

WILDLIFE

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-9 shows that the total number of nests of species of high federal interest impacted by this, the No Action Alternative and PRLAs would be 1 prairie falcon, 5 ferruginous hawks and 1 golden eagle.

CULTURAL RESOURCES

The type of impacts associated with mining under this alternative would generally be the same as those identified under the Preference Right Lease Issuance and the Bypass Alternative. Table 3-10 shows that for this alternative, 213 sites have been recorded on the portions of the tracts containing federal coal or surface, and between 600 and 708 sites are predicted. These would be destroyed by surface mining unless avoided and left intact.

Utilizing the predicted site density for each tract, the number of sites that may be destroyed at mine start-up (1987) and peak production (2000) has been estimated at 19 and between 58 and 78, respectively. Sites on tracts to be underground mined may be destroyed or disturbed by subsidence, and additional sites inside and outside of the tracts may be directly or indirectly destroyed. Total disturbance for this, the No Action Alternative and PRLAs would occur to 384 recorded sites and between 1,612 and 2,200 predicted sites.

The disturbances to cultural resources would be similar to those in the Bypass Alternative for surface mines. Underground mining may lead to surface subsidence which may destroy or disturb cultural resources. Surface facilities may also destroy sites. Placement of facilities away from sites may help avoid direct destruction, but there may be indirect disturbance to these sites.

Five tracts are within 10 miles of Chaco Culture National Historical Park. Vibrations from blasting or other mine related activities may affect the stability of standing walls within the park.

Subsidence from underground mining and the placement of above ground facilities may destroy a portion of the Pierre's Ruin archaeological community that is not protected by P.L. 96-550. Mining may also introduce foreign audible and visual elements into the surrounding area, which may reduce the interpretive value of the site.

A 2.5 mile segment of the Chacoan Great North Road crosses the Nageezi Tract and passes through the Pierre's Ruin Community. Segments of the road, and associated features outside of the portion of the community not to be leased, may be destroyed.

The National Register eligibility of the 213 recorded sites in these tracts has been determined. A total of 184 sites were found eligible and 29 were found ineligible. Before the mine plan is prepared a cultural resources inventory of the portions of the lease tract, or portions of the mine plan area and adjacent areas that may be affected by lease related activities will be conducted. The National Register eligibility of all located sites will be determined. All sites on federal lands found eligible will be addressed in a mitigation plan. Mitigation treatment for sites within the affected area may vary from data extraction to preservation in place. All cultural resource will be afforded the protection they are guaranteed through state and federal laws/regulations, and all mine lease stipulations.

VISUAL RESOURCES

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Under this alternative, all of the tracts are either in VRM Class III or IV, except for the La Plata #1 and #2 tracts which are not classified. Surface mining and surface facilities on these tracts would alter the visual landscape to a degree unacceptable in their present class.

WILDERNESS

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Under this alternative, surface facilities and operations for an underground mine on the Kimbeto #1 Tract could detract from the wilderness character of the nearby Ah-shi-sle-pah Wilderness Study Area becaused of noise, lighting, and sight of the facilities. Production on this tract is not expected until the year 2000.

RECREATION

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Acres not available for recreation use during mining are shown in Table 3-11.

Under this alternative, the Lee Ranch East, West, and Middle, and Divide tracts are within the corridor being studied for possible placement of the Continental Divide National Scenic Trail. Surface mining of these tracts could disrupt actual trail location and cause a safety hazard for hikers.

LAND USES (Roads, Railroads, Pipelines, Transmission Lines)

Surface Mining

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-12 shows that under this alternative, 96 acres for powerlines and 5 acres for proposed railroads would be disturbed by relocation or removal. Total disturbance for this, the No Action Alternative and PRLAs would be 105 acres for public roads, 177 acres for powerlines, 51 acres for natural gas pipelines, and 44 acres for proposed railroads.

Underground Mining

Table 3-13 shows that under this alternative, 33 acres of rights-of-way for public roads, 11 acres for powerlines, 23 acres for natural gas pipelines, and 27 acres for proposed railroads would be disturbed by subsidence, relocation or removal. Total disturbance for this, the No Action Alternative and PRLAs would be 104 acres for public roads, 22 acres for powerlines, 44 acres for natural gas pipelines, and 27 acres for proposed railroads.

TRANSPORTATION

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-5 shows predicted increases in car

and light duty truck traffic. Traffic increases on New Mexico 53/334 and New Mexico 509 would occur by 1987. By the year 2000, traffic increases would occur on New Mexico 44, New Mexico 57, New Mexico 53/334 and New Mexico 509. A major impact would occur on New Mexico 44, which is a heavily travelled artery from Bloomfield, New Mexico to Albuquerque. Upgrading of this segment has just begun.

The projected increase in numbers of accidents due to this alternative is shown on Table 3-6. By the year 2000, accident increases would occur on New Mexico 53/334 and New Mexico 44.

SOCIAL AND ECONOMIC FACTORS

The type of impacts associated with mining under this alternative would generally be the same as those identified under the Preference Right Lease Issuance. Tables 3-14 through 3-20 show the increases to Grants, Milan, and Farmington for employment, population, housing, community expenditures, water use and wastewater treatment.

AMERICAN INDIAN CONCERNS

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-21 shows that 3 residences (surface mining), 20 residences (underground mining), 6 known gravesites (surface mining), 5 known gravesites (underground mining), and 4 known sacred sites (surface mining) could be disturbed under this alternative. Total disturbance for this, the No Action Alternative and Preference Right Lease Issuance would occur to 52 residences (surface mining) 26 residences (underground mining), 12 known gravesites (surface mining), 10 gravesites (underground mining), and 8 known sacred sites (surface mining).

IMPACTS-TARGET ALTERNATIVE

This alternative proposes to lease 24 tracts. Nineteen tracts would be surface mined and five would be underground mined. Federal in-place reserves to be leased are approximately 1.32 billion tons, with approximately .7 billion tons being recoverable. Projected average annual coal production would be approximately .013 billion tons from 1985 through the year 2007 from 21 of the 24 tracts.

AIR QUALITY

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance but over a larger area. The total emissions under the Target Alternative would be 18,803 tons of TSP per year. Table 3-1 shows that, under worst-case meteorological conditions, the New Mexico State 24-hour standard of 150 ug/m^3 would be exceeded by 84 ug/m^3 with a TSP level

at the mines of 234 ug/m3. The 234 ug/m3 was obtained by modeling the mines from this, the No Action Alternative and Preference Right Lease Issuance.

The PSD Class II 24-hour limit could be exceeded near the mine boundaries, but the TSP level would drop within a short distance from the mine. Visual range near the mines would be reduced from 73 to 60 miles. Similar visual reductions will occur at Chaco Culture National Historical Park. The maximum average annual mean was calculated to be 42 ug/m3, which does not exceed the state or federal annual standards.

TOPOGRAPHY AND MINERAL RESOURCES

Surface Mining

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-2 shows that for the Target Alternative, approximately 859 and 10,593 acres would be disturbed in 1987 and the year 2000, respectively. A total of 35,977 acres would be disturbed by mining, of which 2,100 acres would be for surface facilities. The total acreage disturbed by this, the No Action Alternative and PRLAs would be 82,997 acres, this represents less than 1 percent of the EIS region.

Underground Mining

Subsidence impacts would remain the same as those discussed under the No Action Alternative and Preference Right Lease Issuance.

Surface facility construction would cause permanent changes of natural topography on about 400 acres.

Underground hazards and impacts to mineral development would remain the same as those discussed under the No Action Alternative and Preference Right Lease Issuance. Oil and gas potential exists in the region; drilling for these commodities could conflict with coal development.

PALEONTOLOGY

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-3 shows that under the Target Alternative, an estimated 1,400 fossil localities would be disturbed. The estimated total number of fossil localities disturbed by this, the No Action Alternative and PRLAs would be 3,637.

SOILS

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-22 shows that mining facilities (haul roads, structures, storage areas, buildings, and parking areas) would

cause the permanent loss of approximately 78 acres of the soil resource. Approximately 35,977 acres would be disturbed by 24 surface mines, with annual disturbance being approximately 1,719 acres. Surface facilities would disturb approximately 400 acres associated with five underground mines. Surface disturbance at the onset of mining activities (1987) would consist of approximately 1,762 acres. Approximately 4,417 acres of surface disturbance would occur during peak mine production (year 2000). The total acreage disturbed by this, the No Action Alternative, and PRLAs would be 82,997 acres (refer to Table 3-2).

Projected reclamation potential discussed in the No Action Alternative is expected to be similar under this alternative.

WATER RESOURCES

Surface Water

The general impacts on surface water caused by this alternative are the same as those described for the No Action Alternative. The nature of the impacts do not change; the magnitude of the impact is proportional to the amount of surface area disturbed. During mining and reclamation, the larger the area disturbed the less the area contributing surface runoff and the larger the decrease in streamflow and sediment. After mining, the larger the area successfully reclaimed the greater the reduction in sediment yield and streamflow. Increases in the number of mining operations may increase the possibility of accidental contamination of surface water and of failure of impoundments and diversion structures.

Ground Water

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Additional coal development and groundwater pumping under the Target Alternative would create further drawdowns (over and above those caused by Preference Right Lease Issuance in the Entrada Sandstone (Layer 1), Westwater Canyon Member of the Morrison Formation (Layer 3), and Gallup Sandstone (Layer 5). Maximum additional drawdown in the Entrada would be 70 feet, occurring between the years 2026 and 2035. Maximum additional drawdown in the Westwater Canyon Member would be 100 feet, occurring between the years 2021 and 2025, the same as that for the Minimum Surface Owner Conflicts Alternative. Maximum additional drawdown in the Gallup Sandstone would be 300 feet, occurring between the years 1996 and 2005, the same as that for the Minimum Surface Owner Conflicts Alternative. Plate 2 (enclosed in the Draft EIS), indicates a more extensive cone of depression for drawdowns in the range of 10 to 70 feet. The maximum additional drawdowns and the years in which they would occur are summarized in Table 3-23. Total water needs for this, the No Action Alternative and Preference Right Lease Issuance would be approximately 20,150 acre-feet of water per year.

VEGETATION/LIVESTOCK GRAZING

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-4 shows that the Target Alternative would remove approximately 35,952 acres of native vegetation and 6,045 AUMs of livestock forage on BLM and BIA administered allotments over the life of the mines. This represents 1.8 percent of the AUMs in the Chaco Planning Unit (Map 3-1). In addition, 15 reservoirs, 31 miles of fence, 9 wells and a spring would be destroyed by surface mining. A State sensitive plant species, Astragalus wingatus, could be removed by surface mining and facilities.

By the start of production in 1987, 1,819 acres of native vegetation would be removed and 257 AUMs of forage temporarily lost. At the peak of mining in the year 2000, 4,563 acres of vegetation would be removed with 730 AUMs of forage. Eighteen allotments out of the 105 allotments administered by the BLM and BIA in the Chaco Planning Unit (17%) and 104 allottees out of 2,243 allottees (5%) would lose a portion of or all of the AUMs available because of mining the tracts under this alternative. Total disturbance for this, the No Action Alternative and Preference Right Lease Issuance would be to 82,997 acres, 11,243 AUMs, (this represents 3.4 percent of the AUMs in the Chaco Planning Unit), 25 reservoirs, 52 miles of fence, 13 wells, 3 cattleguards, 2 corrals, and a spring and Astragalus wingatus would be affected.

WILDLIFE

The type of impacts associated with mining under the Target Alternative would generally be the same as those identified under the No Action and Bypass Alternatives and Preference Right Lease Issuance. Table 3-9 shows that the total number of nests of species of high federal interest impacted by this, the No Action Alternative and PRLAs would be a prairie falcon, 7 ferruginous hawk, and two golden eagle nests.

CULTURAL RESOURCES

The type of impacts associated with mining under this alternative would generally be the same as those identified under the Preference Right Lease Issuance and Bypass Alternative. Table 3-10 shows that for this alternative, 412 sites have been recorded on the portions of the tracts containing federal coal or surface and between 814 and 1,105 sites are predicted. The sites would be destroyed by surface mining unless avoided and left intact.

Using the predicted site density for each tract, the number of sites that may be destroyed at mine start-up (1987) and peak production (2000) has been estimated. Between 32 and 44 sites may be destroyed in 1987, and between 132 and 245 in the area of surface disturbance in the year 2000.

Sites on tracts to be underground mined may be destroyed or disturbed by subsidence. Additional sites inside and outside of the tracts may be directly or indirectly destroyed. Total disturbance for this, the No Action Alternative and Preference Right Lease Issuance would be to 583 recorded sites and between 1,826 and 2,597 predicted sites.

Nine tracts in this alternative are within 10 miles of Chaco Culture National Historical Park. Vibrations from blasting or other mining related activities may affect the stability of standing walls within the park.

Two and a half miles of the Chacoan Great North Road passes through the Nageezi tract. A portion of the road maybe destroyed by subsidence and placement of surface facilities. An extenstion of the Penasco Blanco to Ah-shi-sle-pah road may cross Bisti #1 and #4 tracts.

At the request of the New Mexico State Historic Preservation Officer one area of 80 acres within the Target Alternative is recommended as unsuitable for coal mining under Criterion 7. This parcel, located in the Bisti #1 tract was the scene of a nineteenth century battle between Navajo and Ute Indians. New information derived from ethnographic research could modify this recommendation.

The National Register of Historic Places eligibility of the 412 sites recorded in the tracts has been determined. Of the 412 sites that have had their eligibility determined 332 were found eligible for inclusion while 80 were found ineligible. Before the mine plan is prepared a cultural resources inventory of the portions of the lease tract, or portions of the mine plan area and adjacent areas that may be affected by lease related activities will be conducted. The National Register eligibility of all located sites will be determined. All sites on Federal lands found eligible will be addressed in place. All cultural resources will be afforded the protection they are guaranteed through state and federal laws/regulations, and all mine lease stipulations.

VISUAL RESOURCES

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. All of the tracts under this alternative are either in VRM Class III or IV, except for La Plata #1 and #2, which are not classified. Surface mining and surface facilities on these tracts would alter the visual landscape to a degree unacceptable in their present class. Surface mining of the Bisti #2 Tract would destroy approximately 320 acres of scenic badlands and would disrupt the topography and scenic view from the Bisti WSA/ACEC. The badlands on this tract are in a scenic quality A-rated area and provide good sightseeing values.

WILDERNESS

Under this alternative, surface mining of the Bisti #2 Tract would cause the same type of impacts to the Bisti WSA as those identified in the No Action Alternative for existing leases. Production on this tract would be expected to begin in 1987 and annual production would have nearly doubled by the year 2000.

RECREATION

Under this alternative, the type of impacts to dispersed recreation would be the same as those discussed under the No Action Alternative and Preference Right Lease Issuance. Acres not available for recreation use are shown in Table 3-11.

Surface mining of the Bisti #2 Tract would destroy the scenic and recreational values of a portion of the Bisti Badlands and would have very detrimental visual and noise effects upon the quality of recreational experience in the Bisti management area directly adjacent. Objectionable sounds would include sirens and noises from blasting, operation equipment, and transportation. Adverse visual effects would result from the sight of the mining operation from within the WSA, lighting of the sky during night operations, and decreased visibility due to dust produced by mining.

In addition to the tracts identified under the Bypass and Minimum Surface Owner Conflicts Alternatives as possibly impacting the Continental Divide National Scenic Trail, the Johnson Trading Post and Star Lake East #1 tracts also fall within the corridor.

LAND USES (Roads, Railroads, Pipelines, Transmission Lines)

Surface Mining

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-12 shows that under the Target Alternative, 30 acres of rights-of-way for public roads, 177 acres for powerlines, 57 acres for natural gas pipelines, and 5 acres for proposed railroads would be disturbed by relocation or removal. Total rights-of-way disturbance for this, the No Action Alternative and PRLAs would be to 135 acres for public roads, 258 acres for powerlines, 108 acres for natural gas pipelines, and 44 acres for proposed railroads.

Underground Mining

The underground impacts associated with mining under this alternative would be the same type and number as those identified for the Minimum Surface Owner Conflicts Alternative.

TRANSPORTATION

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-5 shows predicted increases in car and light duty truck traffic. Traffic increases on New Mexico 44, New Mexico 57, and New Mexico 371 would occur by 1987. By the year 2000, traffic increases would occur on New Mexico 53/334, New Mexico 197 and New Mexico 170.

The projected increase in number of accidents due to this alternative is shown on Table 3-6. By the year 2000, accident increases would occur on New Mexico 44, New Mexico 197, and New Mexico 371. In 1987, the most significant increase would occur on New Mexico 371, which is presently being redesigned and paved. Once construction is completed, the accident rate for this highway may decrease.

SOCIAL AND ECONOMIC FACTORS

The type of impacts associated with mining under this alternative would generally be the same as those identified under the Preference Right Lease Issuance. Tables 3-14 through 3-20 show the increases in Grants, Milan, Farmington, and Cuba for employment, housing, population, community expenditures, water use and wastewater treatment.

AMERICAN INDIAN CONCERNS

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-21 shows that 50 residences (surface mining), 20 residences (underground mining), 23-33 known gravesites (surface mining), and 3 known sacred sites (surface mining) could be disturbed under this alternative. Total disturbance for this, the No Action Alternative and Preference Right Lease Issuance would be to 99 residences (surface mining), 26 residences (underground mining), 29-39 known gravesites (surface mining), 5 gravesites (underground mining), and 7 known sacred sites (surface mining).

IMPACTS-HIGH ALTERNATIVE

This alternative proposes to lease all 39 tracts brought forward in the tract selection process. Of the total, 28 tracts would be surface mined and 11 would be underground mined. Federal in-place reserves that would be leased total approximately 1.94 billion tons, of which approximately 1.09 billion tons are recoverable. Projected average annual coal production would be approximately .024 billion tons from 1985 through the year 2007 for 36 of the 39 tracts.

AIR QUALITY

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance, but over a greater areal extent. The total emissions under the High Alternative would be 30,514 tons of TSP per year. Table 3-1 shows that for this alternative, under worst-case meteorological conditions, the New Mexico State 24-hour standard of 150 ug/m^3 would be exceeded by 86 ug/m^3 with a TSP level at the mines of 236 ug/m^3. With an annual average of 42 ug/m^3, which does not exceed the state or federal annual standards. The 236 ug/m^3 ws obtained by modeling the mines from this, the No Action Alternative and PRLAs.

The PSD Class II 24-hour increment could be exceeded near the mine boundaries, but would drop within a short distance from the mine. The visual range near the mine would be reduced from 73 to 60 miles.

TOPOGRAPHY AND MINERAL RESOURCES

Surface Mining

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-2 shows that for this alternative, approximately 1,771 and 23,641 acres would be disturbed in 1987 and the year 2000, respectively. A total of 68,641 acres would be disturbed by mining, of which 3,500 acres would be for surface facilities. The total acreage disturbed by this, the No Action Alternative and PRLAs would be 115,661 acres, this represents less than 1 percent of the EIS region.

Underground Mining

Subsidence impacts would remain the same as discussed in the No Action Alternative and Preference Right Lease Issuance.

Surface facility construction would cause permanent changes of natural topography on about 880 acres.

Underground hazards and impacts to mineral development would remain the same as those discussed in the No Action Alternative and Preference Right Lease Issuance. Oil and gas potential exists in the region, and drilling for these commodities could conflict with coal development.

PALEONTOLOGY

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative. Table 3-3 shows that under this alternative, an estimated 1,693 fossil localities would be disturbed. The estimated total number of fossil localities disturbed by this, the No Action Alternative and PRLAs would be 3,930.

SOILS

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-22 shows that mining facilities (haul roads, structures, storage areas, buildings, and parking areas) would cause a permanent loss of approximately 78 acres of the soil resource. A total of approximately 68,641 acres would be affected by 28 surface mines, with annual surface disturbance consisting of approximately 2,230 acres per year. Surface facilities associated with 11 underground mines would disturb approximately 880 acres. Surface disturbance at the onset of mining activities (1987) would consist of approximately 3,697 acres, and approximately 8,559 acres of disturbance would occur during peak mine production (year 2000). Total acreage

disturbed by this, the No Action Alternative and PRLAs would be 115,661 acres (refer to Table 3-2).

Projected reclamation potential under the No Action Alternative is expected to be similar under this alternative.

WATER RESOURCES

Surface Water

The general impacts on surface water caused by this alternative are the same as those described for the No Action Alternative. The nature of the impacts do not change; the magnitude of the impact is proportional to the amount of surface area disturbed. During mining and reclamation, the larger the area disturbed, the less the area contributing surface runoff and the larger the decrease in streamflow and sediment. After mining, the larger the area successfully reclaimed, the greater the reduction in sediment yield and streamflow. Increases in the number of mining operations may increase the possibility of accidental contamination of surface water and of failure of impoundments and diversion structures.

Ground Water

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Additional coal development and groundwater pumping under the High Alternative would create further drawdowns (over and above those caused by Preference Right Lease Issuance) in the Entrada Sandstone (Layer 1), Westwater Canyon Member of the Morrison Formation (Layer 3), and Gallup Sandstone (Layer 5). The drawdown difference for the Entrada, Westwater Canyon Member, and Gallup Sandstone are indistinguishable from the drawdown difference under the Target Alternative, except for slight outward movement of the drawdown contours (refer to Plate 2 enclosed in the Draft EIS). The maximum additional drawdowns and the years in which they would occur are summarized in Table 3-23. Total water needs for this, the No Action Alternative and Preference Right Lease Issuance would be approximately 21,100 acre-feet per Year.

VEGETATION/LIVESTOCK GRAZING

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-4 shows that the High Alternative would remove approximately 68,641 acres of native vegetation and 9,977 AUMs of livestock forage on BLM and BIA administered allotments over the life of the mines. This represents 3 percent of the AUMs in the CHaco Planning Unit (Map 3-1). In addition, 28 reservoirs, 73 miles of fence, 17 wells, a spring and a corral would be destroyed by surface mining. A State sensitive plant species, Astragalus wingatus, could be removed by surface mining and facilities.

By the start of production in 1987, 3,771 acres of native vegetation would be removed and 490 AUMs of forage temporarily lost. At the peak of mining

in 2000, 8,863 acres of vegetation would be removed eliminating 1,230 AUMs of forage. Thirty allotments out of the 105 allotments administered by BLM and BIA in the Chaco Planning Unit (29%) and 246 allottees out of 2,243 allottees (11%) would lose a portion of or all of the AUMs available because of mining the tracts under this alternative.

Total disturbance for this, the No Action Alternative and Preference Right Lease Issuance would be to 115,661 acres, 15,175 AUMs, (this represents 4.6 percent of the AUMs in the Chaco Planning Unit), 38 reservoirs, 94 miles of fence, 21 wells, 3 cattleguards, 3 corrals, a spring, and Astragalus wingatus would be affected.

WILDLIFE

The type of impacts associated with mining under the High Alternative would generally be the same as those identified under the No Action and Bypass Alternatives and Preference Right Lease Issuance. Wintering mule deer and elk on the La Plata #3 Tract would be subject to stress associated with mining on 100 acres of their range. In 1987, 66 acres of big game winter range would be mined, with disturbance occurring throughout the tract from associated activities. By the year 2000, mining would be complete.

Table 3-9 shows that the total number of nests of species of high federal interest impacted by this, the No Action Alternative and PRLAs would be a prairie falcon's, 7 ferruginous hawk, and two golden eagle nests.

CULTURAL RESOURCES

The type of impacts associated with mining under this alternative would generally be the same as those identified under the Preference Right Lease Issuance and Bypass Alternative. Table 3-10 shows that for this alternative, 638 sites have been recorded on the portions of the tracts containing federal coal or surface, and between 1,727 and 2,295 sites are predicted. They would be destroyed by surface mining unless avoided and left intact.

Using the predicted site density for each tract, the number of sites that may be destroyed at mine start-up (1987) and peak production (2000) has been estimated. Between 32 and 44 sites may be destroyed in 1987, and between 132 and 245 in the area of surface disturbance in the year 2000. Sites on tracts to be underground mined may be destroyed or disturbed by subsidence. Additional sites inside and outside of the tracts may be directly or indirectly destroyed. Total disturbance for this, the No Action Alternative and PRLAs would be 809 recorded sites and between 2,739 and 3,787 predicted sites.

Eleven tracts in this alternative are within 10 miles of Chaco Culture National Historical Park. Vibrations from blasting or other mining related activities may affect the stability of standing walls within the park. An unstabilized standing Chacoan masonry structure in the Crownpoint Northeast tract could also be damaged.

The Chacoan South Road crosses approximately 0.3 miles of the Crownpoint Northeast tract. It and any associated features or structures would

be destroyed by mining. The total disturbance to Chacoan roads would include segments of the Chacoan Great North Road and the Chacoan South Road (approximately 3 miles) and an unknown amount of the Ah-shi-sle-pah road.

The mining of the Chico Wash South Tract under the High Alternative would cause direct and indirect disturbance to the Azabache Stage Station. Blasting may weaken or cause destruction of the standing walls.

Two additional areas in the High Alternative are recommended as unsuitable for coal mining, both in the Crownpoint Northeast tract. One hundred and sixty acres are set aside to protect a Chacoan shrine with standing masonry walls. Another 280 are set aside to protect a Basketmaker III-Pueblo I pithouse village and portions of the Chacoan South Road.

The National Register of Historic Places eligibility of the 638 recorded sites has been determined. Four-hundred and thirty-seven sites were found eligible while 201 were found ineligible. Before the mine plan is prepared a cultural resources inventory of the portions of the lease tract, or portions of the mine plan area and adjacent areas that may be affected by lease related activities will be conducted. The National Register eligibility of all located sites will be determined. All sites on federal lands found eligible will be addressed in place. All cultural resources will be afforded the protection they are guaranteed through state and federal laws/regulations, and all mine lease stipulations.

VISUAL RESOURCES

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. In this alternative, all of the tracts are either VRM Class III or IV, except for the La Plata Tracts #1, #2, #3, and #4, which are not classified. Surface mining and facilities on these tracts would alter the visual landscape to a degree unacceptable in their present class. Surface mining of the Chico Wash South Tract would greatly affect the scenic views from atop the mesas of the Ignacio Chavez area.

WILDERNESS

Surface mining of the Chico Wash South Tract would have the same type of impacts to the wilderness character of the Ignacio Chavez WSA as those discussed in the No Action Alternative for existing leases near the Bisti WSA. Impacts from production would be present in 1987.

RECREATION

Under this alternative, the type of impacts to dispersed recreation would be the same as those discussed under the No Action Alternative and Preference Right Lease Issuance. Acres not available for recreation are shown in Table 3-11.

Surface mining of the Chico Wash South Tract would have impacts to two specific recreation resources. The Azabache Stage Station is within this tract; its structures could be weakened by blasting. Access to the site would also be cut off. This entire tract is within a scenic viewshed experienced from atop the mesas of the Ignacio Chavez WSA directly to the south. Mining would severely alter this view.

Tracts within the Continental Divide National Scenic Trail corridor that have not been mentioned previously include the Star Lake East (LC), Crownpoint Northeast and Crownpoint (HC). Mining on these tracts would impact the corridor in the same same way as mining on other tracts discussed under the Bypass, Minimum Surface Owner Conflicts, and Target Alternatives.

LAND USES (Roads, Railroads, Pipelines, Transmission Lines)

Surface Mining

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-12 shows that under the High Alternative, 141 acres of rights-of-way for public roads, 354 acres for powerlines, 66 acres for natural gas pipelines, and 5 acres for proposed railroads would be disturbed by relocation or removal. Total right-of-way disturbance for this, the No Action Alternative and PRLAs would be 246 acres for public roads, 435 acres for powerlines, 117 acres for natural gas pipelines, and 44 acres for proposed railroads.

Underground Mining

Table 3-13 shows that for this alternative 70 acres of rights-of-way for public roads, 78 acres for powerlines, 35 acres for natural gas pipelines, and 62 acres for proposed railroads would be disturbed by subsidence, relocation or removal. Total right-of-way disturbance for this, the No Action Alternative and PRLAs would be to 141 acres for public roads, 89 acres for powerlines, 56 acres for natural gas pipelines, and 62 acres for proposed railroads.

TRANSPORTATION

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-5 shows predicted increases in car and light duty truck traffic. By the year 2000, traffic increases would occur on New Mexico 53/344, New Mexico 57 (from Crownpoint to Junction 371), and New Mexico 509.

The Ta-ha-bah Well, Hogback, Twin Buttes, Pinehaven, and Breadsprings tracts are located approximately 2 to 12 miles south of the Atchison-Topeka and Santa Fe mainline near Gallup. Coal developed on these tracts would be transported to market destinations via this railroad. Detailed impacts of the construction of and traffic on haul roads from these tracts to loadout facilities on the mainline will be analyzed at the mine plan stage of the leasing process. Frequency of road maintenance and maintenance costs would increase. The costs are expected to be even greater than the normal fees collected from highway use by these vehicles.

The projected increase in the number of accidents due to this alternative is shown on Table 3-6. An increase would occur on New Mexico 44, New Mexico 197, and New Mexico 371 by 1987. By the year 2000, accident increases would also occur on New Mexico 32, New Mexico 44, New Mexico 197 and New Mexico 371. New Mexico 371 is presently being redesigned and paved, and the accident rate for this highway may decrease once construction is completed.

SOCIAL AND ECONOMIC FACTORS

The type of impacts associated with mining under this alternative would generally be the same as those identified under Preference Right Lease Issuance. Tables 3-14 through 3-20 show the increases to Grants, Milan, Farmington, Cuba, Gallup, and Crownpoint-Thoreau for employment, housing, population, community expenditures, water use, and wastewater treatment.

AMERICAN INDIAN CONCERNS

The type of impacts associated with mining under this alternative would generally be the same as those identified under the No Action Alternative and Preference Right Lease Issuance. Table 3-21 shows that 345 residences (surface mining), 110 residences (underground mining), 25-35 known gravesites, and 3 known sacred sites (surface mining), and 1 known sacred site (underground mining) could be disturbed under this alternative. Total disturbance for this, the No Action Alternative and Preference Right Lease Issuance would be to 394 residences (surface mining), 116 residences (underground mining), 31-41 known gravesites (surface mining) and 5 known gravesites (underground mining), 7 known sacred sites (surface mining), and 1 known sacred site (underground mining).

ALTERNATIVE MITIGATING MEASURES

The analysis of the environmental effects of the proposed action and major program alternatives in chapter 3 describes the environmental effects remaining after application of and compliance with all regulations, statutes, standard lease terms and agency committed measures such as special stipulations to carry out the results of the application of unsuitability criteria. This section on mitigating measures describes additional actions that might be taken to further reduce the adverse effects of the proposal. In accordance with CEQ regulations, these additional measures are not included in the proposed action or analyzed in Chapter 3. Some of the measures listed are alternatives to existing requirements; others cover new areas. These measures could be required by BLM, BIA, OSM or the State of New Mexico. A decision whether to adopt any of these measures will be made as part of the process to decide whether and how much coal will be leased. Where the environmental effect of the proposed measure is not self-explanatory, a brief explanation is included.

Mitigation Measure: The lessee shall provide mitigation measures on operations contributing to visibility impairment in Chaco Culture National Historical Park should the park superintendent and the Director of the New Mexico Environmental Improvment Division agree that such impairment is significant and attributable to the lessee's operations. This determination shall be primarily based on visibility monitoring data but may include other proven techniques.

Discussion: Chaco Canyon is a valuable resource, and the protection of it is important to many citizens. Numerous coal leases are located within 10 miles of the park. The possibility exists that coal dust from mining operations or fugitive dust from associated operations such as haul roads may impair visibility in the park. For a fugitive dust source, the ability to predict visibility impairment before operation is limited. However, post-construction monitoring in combination with other techniques could identify the occurrence of impairment and the source of the problem.

Mitigation Measure: If the coal lease is within 50 km of an adjoining state, the lessee shall notify the appropriate air quality control agency of that state of its construction and operation plans.

Discussion: Neighboring states should be allowed to comment on any impact a source in an adjacent state may have on their air quality.

Introduction: The modeling procedures for air quality assumed the worst case conditions. Any changes in the assumed conditions would result in lower predictions of ambient air concentrations. The following possible mitigation mesures could be applied separately or in any combination to reduce the allowable emmissions to a level that would not exceed the ambient standards.

Mitigation Measure: The lessee may be limited in the configuration and location of mine facilities.

Discussion: The model assumed a worst-case configuration for the mine facilities and pit. This configuration is discussed in PEDC, (1982). This configuration places the mine facilities and the pit adjacent to each other and next to the down wind lease boundary. Limiting the configuration would reduce the ambient air concentration at and beyond the least boundary.

Mitigation Measure: Require haul roads to be treated to reduce emissions.

Discussion: Each proposed mine will be examined at the mine plan stage to determine the extent of potential emissions that would be produced. If necessary it would be required to treat the haul roads to reduce emissions. The type of treatment would depend on the control needed.

Mitigation Measure: The lessee shall be required to conduct an intensive inventory to identify any surface exposed fossils. The lessee in conjunction with the Bureau would be required to participate in coordination and consultation with the scientific community to evaluate fossil significance.

Discussion. This measure if adopted would require mandatory inventories prior to surface disturbance of leased lands and would be in addition to the requirements as described in the standard Coal Lease, Section 31. Special Stipulations, (b) Paleontological Resources - (1), which in part states "the lessee shall contact the Bureau of Land Management to determine whether the authorized officer will require the lessee to conduct a paleontological appraisal of the mine plan and adjacent areas, or exploration plan areas, that may be adversely affected by lease - related activities."

Mitigation Measure: The Bureau could work with the New Mexico Museum of Natural History to ensure that adequate construction monitoring and data-recovery programs were developed and implemented. Development of community education projects to enlist local support for protecting the fossils in place, complemented by more vigorous enforcement of restrictions on off-road vehicle use in areas of rich fossil deposits, private or institutional support for an ongoing paleontological research program in the general EIS Region might also offset losses otherwise incurred.

Discussion. The effectiveness of mitigation is difficult to assess. It is limited by such factors as geologic formation, time constraints, type of paleontological resources and management expertise. The basic requisite for mitigation is to satisfy scientific criteria for the retrieval of paleontological data and material that will compensate in some way for the irretrievable loss of potentially significant fossils during the mining operation.

Mitigation Measure: No surface coal mining will be allowed within the boundaries of the Fossil Forest.

Discussion: This measure would have the effect of preserving the paleontological resources in situ to allow for long term paleontological research and extraction. However, during the planning process, with full public participation, a decision was made to include in the applicable PRLAs a stipulation requiring that the Fossil Forest be withheld from actual mining for only up to 10 years, from September 1981, in order to allow paleontological research and salvage.

WATER RESOURCES

Mitigation Measure: The lessee may not use water for irrigation to promote revegetation unless the water has a specific conductance of $\leq$ 4000 micromhos and a sodium adsorption ratio of $\leq$ 18. The lessee shall maintain a water quality monitoring program to record compliance with this requirement.

Discussion. Water quality is a key factor in achieving revegetation success, and current research indicates that water not meeting these standards will retard revegetation efforts. The same or similar requirements could be imposed when a permit under SMCRA is issued.

WILDLIFE

Mitigation Measure: The lessee shall initiate the following actions to protect wintering mule deer and elk habitat in the La Plata #1 and #2 tracts.

1. Public access will be prohibited on a yearlong basis through the life of the mine. This includes the prohibition of hunting or recreational use on lease areas by mine employees.

2. Vehicular speed will be controlled to minimize road kills and for safety of operators. Reflectors to warn wildlife at night of approaching vehicles will be installed.

Discussion. Habitat in the La Plata #1 Tract (200 acres) and La Plata #2 Tract (105 acres) are the most critical in the project area because deer and elk find food and shelter in close proximity in a relatively small area.

CULTURAL RESOURCES

Mitigation Measure: The lessee shall take the following actions to protect Pierre's Ruin Community (Nageezi Tract).

1. Surface disturbing activities shall not be conducted within the boundary of Pierre's Ruin.

2. The lessee shall construct a fence in consultation with the surface management agency to restrict vehicular traffic on a yearlong basis from the Pierre's Ruin Community (Nageezi Tract).

3. Underground mining operations shall be conducted in such a manner so as to prevent surface subsidence that would: (1) create hazardous conditions such as potential escarpment failure and landslides, (23) cause damage to surface structures, and (3) damage or alter the topography in the Pierre's Ruin Community boundary.

Discussion. The Pierre Ruin Community is a Chacoan outlier along the Great North Road. It has received national attention through its inclusion as a protection site in the Chacoan legislation (PL 96-550) and its nomination to the National Register of Historic Places. Over 95 percent of the community is intact, providing a valuable resource for future research and visitor interpretation. The National Park Service and Bureau of Land Management are discussing the feasibility of opening Pierre Ruin Community to guided tours from Chaco Culture National Historical Park. This measure if adopted would provide for the protection of 960 acres in addition to the 440 acres provided for in PL 96-550, and agreed to by the RCT.

Mitigation Measure: The lessee of the Chico Wash South tract shall develop a monitoring plan, approved by BLM, to monitor the affects of blasting on the walls of the historic Azabache Stage Station.

Discussion. The Azabache Station Station site with appropriate buffer zone is contiguous to the Chico Wash South tract. Close proximity blasting could weaken or crack the walls of this historic structure.

WILDERNESS

Mitigation Measure: The lessee shall initiate the following in order to protect the integrity of the Bisti WSA (Bisti #6 Tract).

1. Mining and reclamation operations will be conducted with a minimum of visual impacts as viewed from 1/4 mile within the Bisti WSA.

2. Construction of berms or other structures will be used as needed to reduce or eliminate visual impacts.

3. Travel by construction and mining employees will be restricted to rights-of-way, access roads and existing public roads.

4. Rights-of-ways and access roads developed for mining/reclamation operations will be located in the Southern portion of the Bisti #6 tract.

Mitigation Measure: No surface coal mining would be allowed in the badlands within the Ah-shi-sle-pah WSA.

RECREATION

Mitigation Measure: If the CDNST is routed through or adjacent to the Star Lake West #2, Gallo Wash #1, Hospah #1, Star Lake #1 or Johnson Trading tracts the lessee shall, in conjunction with the surface management agency, provide access along the CDNST to ensure the safety of hikers or other users.

Discussion. Public law 90-543 of October, 1968, established the Continental Divide National Scenic Trail (CDNST) from Mexico to Canada. The actual treadway for the CDNST has not been established, but the basic study route is a corridor 30 miles wide (Woodard, L.L. 1982) (refer to Map 2-4). There is also a zone of concern 50 miles on either side of the Continental Divide. Deliberations are currently under way to move the corridor several miles east of the present location, which would avoid the competitive coal leasing tracts.

Mitigation Measure: The lessee shall provide vehicular access (all weather) to the Azabache Stage Station upon completion of mining and reclamation (Chico Wash South Tract).

Discussion. Azabache State Station is potentially eligible for inclusion on the Register of Historic Places, both for its heritage value and its potential yield of scientific information. The site is an early Anglo- Hispanic homestead and possible stage station circa 1880.

LAND USES

Mitigation Measure: Surface facilities on La Plata tracts 2 and 4 shall be located to avoid the Animas-La Plata irrigation project.

Discussion. There are approximately 600 acres in the Animas-La Plata irrigation project that overlaps these tracts. This irrigation project is a Bureau of Reclamation project in cooperation with surrounding communities.

TRANSPORTATION

Mitigation Measure: The lessee would be required to construct right-of-way fences along rural roads on which increased traffic results in hazards to livestock as specified by BLM at mine plan stage..

Discussion. Livestock including sheep, goats, and cattle have traditionally grazed in the vicinity of unfenced rural roadways. Injury and loss of livestock could increase with the increased daily traffic. Fencing these roadways would reduce vehicular accidents involving livestock.

SOCIAL ECONOMIC FACTORS

Mitigation Measure: The Bureau of Land Management proposes to raise the rentals on PRLAs to the fair-Market value and have the State Of New Mexico designate its share of the increased revenues for socio-economic impact assistance.

AMERICAN INDIAN CONCERNS

Mitigation Measure: The lessee shall submit a hiring plan at mine plan stage for exercising a preference in extending job offers to local Navajos who are qualified and shall make training available to interested Navajos according to the lessees needs.

Mitigation Measure: If the lease coincides with a Navajo plant gathering area, the lessee shall contact a local medicine man or conduct an inventory of the gathering area to determine rare plant species that are used by religious practioners and to include seeds of these species in reseeding mixtures for reclamation.

Discussion. A Number of the plant species that are used in religious ceremonies are quite rare and often occur in one or two confined areas. If the plants are not located in the general area of need considerable logistics and expense would be involved to locate and gather the rare plants to continue their religious practices.

Mitigation Measure: Adopt the 17 "demands" of the Navajo Tribe (letter 300 signed by Peterson Zah) with the exception of demand (a) recognizing the tribe as qualified surface owners. All of the other "demands" are adopted as alternative mitigation.

Discussion: These "demands" are located in the published letters in Volume 2 of this EIS. The BLM believes that neither the Navajo Nation nor the individual Navajos which are grazing lessees of public lands can be qualified surface owners as that term is defined in the Surface Mining Control and Reclamation.

Mitigation Measure: Adopt the Memorandum of Understanding #NMSO-110 (signed February 12, 1979) between the BLM, the BIA and the Navajo Tribe which identified the following methods for resolving occupancies on public lands.

1. Voluntary relocation to non-BLM lands;
2. Purchase of the occupant's equities outright;
3. Mandatory relocation to non-BLM lands;
4. Purchase of BLM lands;
5. Purchase of non-BLM lands;
6. Exchange;
7. Lease;
8. Life estate;
9. Permit (license);
10. Temporary relocation until mining and rehabilitation is completed;
11. Stipulation in future mineral leases to require mining companies to handle;
12. Relocation to land in the Navajo-Malpais exchange;

Mitigation Measure: If lease contains occupied dwellings (farmsteads, grazing lands, etc.) an area within 300 feet of the exterior boundaries of the occupied land is unsuitable for surface coal mining unless the lessee receives written permission from the occupant or owner allowing surface coal mining operations and approval of such permission by the Area Director, Bureau of Indian Affairs, Navajo Area Office. In addition, the lessee shall provide for ingress and egress to the occupied land. Where the lessee and the occupant

desire to conclude a relocation agreement, they may call upon the Eastern Navajo Agency, Bureau of Indian Affairs, to facilitate relocation arrangements.

Mitigation Measure: Unauthorized Occupants: The lessee is responsible for the costs of relocation as specified in this section.

A. The lessee shall pay to each family listed as being unauthorized occupants:

1. The fair market value of the dwelling and other improvements such as corrals, and fences that will be displaced by mining.

2. Actual reasonable expenses for moving, including actual reasonable expenses for looking for a replacement farm or ranch and direct losses from a business or ranch operations, as determined by using 41 CFR Subpart 114-50.6 as a guideline.

3. A replacement housing payment not to exceed $15,000 to be computed using 41 CFR Subpart 114-50.8 as a guideline.

B. In lieu of the payments in paragraphs A #1-2 of this section, the displaced person may accept:

1. $500 in lieu of moving payments;

2. $500 in lieu of payments for expenses of searching for a new farm or ranch.

C. The lessee, through a reimbursable agreement with the Bureau of Indian Affairs, shall provide Relocation Assistance Advisory Services, as provided in 41 CFR 114-50.4.

D. No family who will become displaced will be required to surrender possession of their property before payment is made to them or deposited in trust for them with the Bureau of Indian Affairs. In all cases, the affected family shall be given at least 90 days written notice of the date by which the family is required to move from the acquired property.

E. No family shall be required to move unless the lessee has shown, to the BLM satisfaction, the availability of comparable replacement housing as defined in 41 CFR 114-50.201 (d)

Value Determination

A. All real property must be appraised prior to initiation of negotiations.

B. Lesee must give the owner or his representative an opportunity to accompany the appraiser during his inspection of the property.

Just Compensation

In no case will the amount established as just compensation be less than the approved appraisal of the estimated fair market value of the property.

The lessee will provide the owner of the property with a written statement of the amount established as just compensation. The summary statement shall include the following:

A. Identification of the real property and the estate or interest therein to be acquired.

B. Identification of the buildings, structures and other improvements considered to be part of the real property for which the offer of just compensation is made.

C. A statement explaining the basis for the determination of just compensation and that such determination:

1. Is based on the estimated fair market value of the property.

2. Is not less than the approved appraisal of the property.

In cases where the mining of coal would leave the owner of the property with an uneconomical remant, the lessee shall offer to acquire the entire property.

Discussion: This mitigation measure has been proposed at BIA's suggestion and would be used in place of the current proposed term for unauthorized occupants. This provision is based on the standards which would apply if the relocations qualified for assistance under the Uniform Relocation Assistance Act and tries to be consistent with the Navajo Tribe's Impact and Resettlement Policy and Plan. Although the BLM feels these standards are not legally required, they are an option. The major differences between this stipulation and the proposed stipulation are that this one provides for a relocation advisory service, gives compensation for lost farming and ranching income, and sets definite standards for the quality of the replacement housing. Similar types of procedures were used to move Navajos living in the area of the Navajo Irrigation Project, a 110,000 acre farming endeavor by the Navajo Tribe that resulted in the relocation of Navajo families in the same general area.

UNAVOIDABLE ADVERSE IMPACTS

The same type of unavoidable adverse impacts identified in Preference Right Lease Issuance and Bypass Alternative would occur in the last three alternatives only the impacts would be greater and would be commensurate with the level of mining. Because of this, the reader is referred to the narrative in the first two alternatives. The discussion of unavoidable adverse impacts is limited to impacts that can not be mitigated during mining and would remain during the life of the mine and/or after mining and reclamation operations are completed.

PREFERENCE RIGHT LEASE ISSUANCE (impacts are generally the same for all PRLA alternatives)

A short-term increase in TSP would occur because of surface mine disturbance and traffic increases on unpaved roads. The increased population would cause an increase in the emmission of all NAAQS pollutants.

Soil productivity would be lost and regained periodically (regular intervals) on approximately 22,020 acres during the life of the mines. An unquantified amount of soil would be lost from disturbed areas prior to reclamation or revegetation. Local intense thunderstorms, summer and spring, would result in high runoff events causing further degradation of surface soils through water erosion. Soil disturbance during the life of the mines would result in wind erosion. Removal and handling operations would cause a loss of topsoil and destruction of soil structure. Incorporation of clay and silt material from the subsoils would cause degradation to shallow loamy topsoils. The productive capacity of the soils involved would be decreased from the complete destruction of the natural soil profiles and from the impacts to the soils properties which determine moisture regime and fertility.

A portion of 1,137 fossil localities of the late Cretaceous Crevase Canyon, Menefee, and Kirtland/Fruitland formations could be destroyed or damaged during mining activities. Fossils of these formations are generally vertebrate fossils of dinosaurs and early mammals. A portion of an estimated 1,000+ predicted cultural sites of the prehistoric and historic human record of the San Juan Basin could be unavoidably destroyed. Increased losses through illegal collection or vandalism would also be unavoidable. The data from these cultural resources would be lost. The portion of any site not included in further data recovery would be destroyed by surface disturbance, and the data contained in it would be lost.

Harassment and shooting of animals due to increased human activity in the area and loss of wildlife habitat would occur. One prairie falcon, 5 ferruginous hawks, and nesting sites could be disturbed or disrupted due to mining activities.

Temporary loss of 20,020 acres of native vegetation and wildlife habitat and 2,032 AUM's of forage for livestock for the length of the mine or until reclamation is completed would be unavoidable due to mining.

Significant increases in traffic in the San Juan Basin would cause traffic congestion, increased accidents (89 in 2000) and road kills (including livestock) and a demand for more and better road maintenance.

Population would increase by 1,923 in the Cuba area in the year 2000, housing need would increase by 687 units in Cuba in the year 2000. The additional income and buying power generated would increse the local rate of inflation. The effects of this inflation would be felt most acutely by persons living on fixed incomes and those with lower-paying employment such as trades and service workers. The increased labor requirements of the mining and construction industries, together with their relatively high wage scales, would make it more difficult for employers in lower-paying industries and government to hire and retain qualified employees.

Thirty-nine Navajo families could be relocated. These and many other Navajos living in the area would experience significant impacts on their traditional lifestyle through the influx of non-Indians into the area. Mining could disrupt the use of an unknown number of sacred and gathering areas for materials used in religious ceremonies. Eleven gravesites could be destroyed. Traditional Navajo lifestyles, of grazing livestock, could be disrupted or destroyed for the life of the mine, if relocation or settlement was not satisfactorily administered.

BYPASS ALTERNATIVE

Unavoidable adverse impacts associated with mining this alternative would generally be the same type as those identified under Preference Right Lease Issuance, with the following exceptions.

A portion of 271 fossil localities of the late Cretaceous Crevase Canyon, Menefee and Kirtland/Fruitland formations could be destroyed or damaged during mining activities.

Soil productivity would be lost and regained periodically (regular intervals) on approximately 6,130 acres during the life of the mines. An unquantified amount of soil would be lost from disturbed areas prior to reclamation or revegetation.

Temporary loss of 6,130 acres of native vegetation and wildlife habitat and 603 AUM's of forage for livestock for the length of the mine or until reclamation completed would be unavoidable due to mining. Actual availability of the reclaimed area for grazing would depend upon the procedures and time frames specified for reclamation in a mine plan and the success of the procedures used to reclaim the area.

Harassment and shooting of animals could occur due to increased human activity in the area, and wildlife habitat might be lost. One ferruginous hawk and nesting site could be disturbed or disrupted due to mining activities.

A portion of 165 to 188 predicted cultural sites of the prehistoric and historic human record of the San Juan Basin would be unavoidably destroyed.

Sites disturbed or destroyed through unauthorized excavation, collection or other disturbances would lose a portion of their data. Monitoring, surveillance, fencing, and other protective means cannot prevent all unauthorized activities. All sites destroyed would lose their potential for visitor interpretation.

Solitude in the Bisti Wilderness Study Area would be disrupted by noise due to mining of Bisti #6. The recreational experience of hikers on the CDNST could be disturbed due to the noise level and destruction of natural landforms if the trail is actually routed through any of these tracts. Surface mining of Bisti #4 would destroy part of the scenic recreation area known as the fossil forest.

An estimated increase of one traffic accident in the year 2000 and 5 accidents are projected in the region.

Approximately four Navajo families could be relocated, three gravesites and one sacred site could be disturbed under this alternative and can not be avoided.

MINIMUM SURFACE OWNER CONFLICTS ALTERNATIVE

Unavoidable adverse impacts associated with mining this alternative would generally be the same type as those identified under Preference Right Lease Issuance and Bypass Alternative, with the following exceptions.

Destruction of overlying strata, and a periodic loss and regaining soil productivity could occur on approximately 19,302 acres, and subsidence could occur on up to 21,000 acres.

A portion of an estimated 136 fossil locality of the late Cretaceous Crevase Canyon, Menefee and Kirtland/Fruitland formation could be destroyed or damaged during mining activities.

Temporary loss of 19,302 acres of native vegetation and wildlife habitat and 4,268 AUMs of forge for livestock grazing for the length of the mine or until reclamation is completed would be unavoidable.

Potential disturbance on 200 acres of wintering mule deer and elk range due to mining activities for the life of the mine.

A portion of 600 to 708 predicted cultural sites of the prehistoric and historic human record of the San Juan Basin could be unavoidably destroyed.

In 1987, an estimated 2 accidents and in the year 2000 an estimated 11 accidents would be unavoidable in the region.

Population would increase by about 1,827 in the Grants area by 1987 and 2,977 in the year 2000. An increase in housing needs would not be a significant result of new competitive coal leasing.

Approximately 23 Navajo families could be relocated.

TARGET ALTERNATIVE

Unavoidable adverse impacts associated with mining this alternative would generally be the same type as those identiifed under Preference Right Lease Issuance and Bypass Alternative, with the following exceptions.

Destruction of overlying strata, and a periodic loss and regaining of soil productivity could occur on approximately 35,977 acres, and subsidence, could occur on up to 21,000 acres.

A portion of an estimated 1,400 fossil localities of the late Cretaceous Crevase Canyon, Menefee and Kirtland/Fruitland formation could be destroyed or damaged during mining activities.

Temporary loss of 35,977 acres of native vegetation and wildlife habitat and 6,045 AUM's of forage for livestock grazing for the life of the mine or until reclamation is completed would be unavoidable.

Two ferruginous hawks', and one golden eagle and their nesting sites could be disturbed or disrupted due to mining activities for the life of the mine. Potential disturbance on 200 acres of wintering mule deer and elk range due to mining activities for the life of the mine.

A portion of 814 to 1,105 predicted cultural sites of the prehistoric and historic human record of the San Juan Basin could be unavoidably destroyed.

In 1987, an estimated 7 accidents and in the year 2000 an estimated 32 accidents would be unavoidable in the region.

Population would increase by about 859 in the Cuba, and 3,525 in Milan in the year 2000. Housing needs would increase by about 307 units in Cuba in 2000.

Approximately 70 Navajo families could be relocated, and a portion of 23-33 gravesites and three sacred areas could be destroyed due to mining activities.

HIGH ALTERNATIVE

Unavoidable adverse impacts associated with mining this alternative would generally be the same type as those identiifed under Preference Right Lease Issuance and Bypass Alternative, with the following exceptions.

Destruction of overlying strata, and a periodic loss and regaining of soil productivity on approximately 68,641 acres and subsidence could occur on up to 37,081 acres.

A portion of an estimated 1,693 fossil localities of the late Cretaceous Crevase Canyon, Menefee and Kirtland/Fruitland formation could be destroyed or damaged during mining activities.

Temporary loss of 68,641 acres of native vegetation and wildlife habitat and 9,977 AUM's of forage for livestock grazing for the length of the mine or until reclamation is completed would be unavoidable.

Two ferruginous hawks, and one golden eagle and their nesting sites could be disturbed or disrupted due to mining activities for the life of the mine. Potential disturbance on 300 acres of wintering mule deer and elk range due to mining activities for the life of the mine.

A portion of 1,727-2,295 predicted cultural sites of the prehistoric and historic human record of the San Juan Basin would be unavoidably destroyed.

Noise and visual impacts upon the wilderness character of Ignacio Chavez WSA as a result of surface mining of Chico Wash South would be unavoidable.

In 1987, an estimated 13 accidents and in the year 2000 about 64 accidents would be unavoidable in the region.

Population would increase by approximately 2,573 in Cuba, 4,230 in Grants and 5,481 in Gallup, 4,230 in Milan, and 3,342 in Crownpoint/Thoreau. Housing needs could increase by 946 units in Cuba, 1,528 units in Grants, 1,965 units in Gallup, and 1,164 units in Crownpoint/Thoreau due to new federal coal leasing.

Approximately 455 Navajo families could be relocated, and a portion of 25-35 gravesites and four sacred areas could be destroyed due to mining activities for an indefinite period of time.

RELATIONSHIP BETWEEN SHORT-TERM USE AND LONG-TERM PRODUCTIVITY

The same type of relationship between short-term use and long-term productivity in Preference Right Lease Issuance would occur in the four alternatives. However, the difference in magnitude would be commensurate with the level of mining. The reader is referred to the narrative in Preference Right Lease Issuance for the type of impacts that would occur in the remaining four alternatives.

PREFERENCE RIGHT LEASE ISSUANCE (impacts are generally the same for all PRLA alternatives)

At each mine, "deep" wells would be drilled and developed for short-term use for mining operations. After mining ceased, these wells could be transferred to the surface owner and used for livestock and possibly domestic purposes if the water quality was good enough. This short-term use for mining operations would represent an enhancement of the long-term productivity of the water resource by providing a more reliable water supply for the area. Appropriation of ground water for these uses is under the jurisdiction of the New Mexico State Engineer.

Surface and underground mining (short-term) would cause soil disturbance, soil loss, and loss of soil productivity on approximately 47,020 acres. The acreage remaining after reclamation or revegetation would be returned to livestock grazing, wildlife uses and non-coal mineral activities. Reclamation or revegetation success (short-term) would determine long-term productivity and uses. If revegetation is successful grazing will continue and could be enhanced. If not, long term grazing productivity, from what it was, would be less. Thirty-nine families would have changes in their lifestyles.

Coal development would cause long-term changes in lifestyles, cultural and religious values for an unknown number of Navajo families living on or near the area.

There would be positive long-term impacts on productivity through: (1) an increase in the size of the labor force; (2) infrastructure improvements useful for commercial and industrial development; and (3) increased income and buying power which would contribute to the development of a larger and more

diversified trade and services sector. There would also be one potential negative impact on productivity, i.e., an increased vulnerability to economic disruptions caused by fluctuations in the coal industry.

There would be a shift in the long-term from a remote rural area to more populated industralized one. The short-term increase in population would result in expansion of community infrastructure in the long-term.

BYPASS ALTERNATIVE

Surface mining would disturb 6,130 acres. Approximately four families would have changes in their lifestyles.

MINIMUM SURFACE OWNER CONFLICTS ALTERNATIVE

Surface mining would disturb 19,302 acres. Approximately 23 families would have changes in their lifestyles.

TARGET ALTERNATIVE

Surface mining would disturb 35,977 acres. The lifestyles of aproximately 70 families would be changed.

HIGH ALTERNATIVE

Surface mining would disturb 68,641 acres. The lifestyle of approximately 455 families would be changed.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The same type of irreversible and irretrievable commitments of resources in Preference Right Lease Issuance would occur in the other four alternatives. However, the difference in magnitude would be commensurate with the level of mining. The reader is referred to the narrative in Preference Right Lease Issuance for the type of impacts that would occur in the remaining four alternatives.

PREFERENCE RIGHT LEASE ISSUANCE (impacts are generally the same for all PRLA alternatives)

The coal that is mined would be irretrievable, and approximately 50% (241.9 million tons) of coal that is mined by underground methods and 15% that is surface mined would be unrecoverable by present technology.

Some of 1,137 estimated fossils localities of the late Cretaceous, Crevase Canyon, Menefee, and Kirtland/Fruitland formations and associated data would be destroyed and irreversibly lost. The Kirtland/Fruitland contains an un-

paralled record of one of the most important episodes in history, the abrupt impacted or removed through unauthorized, collection, vandalism, or destruction would be irreversibly and irretrievably lost.

Alteration of the present landscape in surface mined areas and the lowering of water levels in the aquifers under surface and underground mined areas would be irreversible and irretrievable. Water consumed each year for the mining and reclamation operations would be irretrievably lost to other uses. Destruction of shallow ground-water sources presently yielding water to shallow wells through surface mining would be an irreversible commitment of these known resources.

A few of the over 542 predicted cultural sites would be destroyed and irreversibly and irretrievably lost. Most sites would be salvaged through excavation, however testing or further recordation would lose scientific value that may have been available with future archaeological techniques. Cultural resources impacted or removed through unauthorized collection, vandalism or destruction would be irreversibly and irretrievably lost.

Surface mining of scenic badlands would irretrievably destroy the scenic, recreational and scientific values of these areas through alteration of unique natural land forms.

Human fatalities and permanent injuries caused by traffic and mining accidents would be irreversible and irretrievable.

Opening up the region with paved roads and introducing a large-scale industrial economy would produce irreversible changes in traditional Navajo lifestyle, from one of traditionally rural to mining and industrial.

Any gravesites and sacred areas that are destroyed would be irreversibly and irretrievably lost.

BYPASS ALTERNATIVE

Some of the estimated 271 fossil localities, and 165 to 188 plus cultural sites would be irretrievably lost.

Surface mining of scenic badlands would irretrievably destroy the scenic, recreational and scientific values of these areas through alteration of unique natural land forms.

MINIMUM SURFACE OWNER ALTERNATIVE

If only the tracts in the Minimum Surface Owner Conflicts Alternative are selected for lease sale, coal in six of the eight Bypass tracts would be irreversibily lost.

Some of the estimated 136 fossil localities, and 600 to 708 cultural sites would be irretrievably lost.

TARGET ALTERNATIVE

Some of the estimated 1,400 fossil localities, and 814 to 1,105 cultural sites would be irretrievably lost.

Surface mining of scenic badlands on the Bisti #2, #4, and #6 tracts kwould be irretrievably destroy the scenic, recreational, and scientific values of these areas through alteration of unique natural landforms.

HIGH ALTERNATIVE

Some of the estimated 1,603 fossil localities, and 1,727 to 2,295 cultural sites would be irretrievably lost.

Surface mining of scenic badlands on the Bisti #2, #4, and #6 tracts would be irretrievably destroy the scenic, recreational and scientific values of these areas through alteration of unique natural landforms.

CHAPTER 4
CONSULTATION AND COORDINATION

CHAPTER 4

CONSULTATION AND COORDINATION

The initial sections of this chapter are devoted to consultation and coordination during the preparation and review of the Draft Environment Impact Statement (DEIS) published on November 30, 1982, and a summary of comments received on the DEIS. Due to the large number of letters and comments received no attempt was made to reproduce them in this chapter, but letters of governmental agencies, and representational groups are reprinted in Volume 2.

Opportunity for early involvement and cooperation in the environmental process was provided to numerous agencies. This involvement occurred through formal agreement or via an informal information exchange. The federal (Department of the Interior) agencies that have been contacted include the following: Bureau of Indian Affairs (BIA) (formal agreement), Fish and Wildlife Service (FWS), Office of Surface Mining (OSM), and U.S. Geological Survey, Water Resources Division (USGS) (formal agreement).

Letters were sent to each of these agencies requesting specific information. The letters requested that a single named contact be established for each agency; this contact has been kept informed on the development of the EIS and thus has acted as an information channel for those agencies.

The USGS submitted information on surface water and some data on underground water. The BIA's input was mostly on a consultation basis regarding the unsuitability of certain lands for coal mining, wildlife, Navajo concerns, and cultural resources. The BIA also provided maps and information about grazing allotments, forage allocation, allotment owners, range improvements and surface ownership in the regions of competitive coal leasing. The BLM's Minerals Division provided coal resource information and, along with the OSM and the FWS, has provided input into this DEIS through review and informal consultation as requested.

CONSULTATION AND COORDINATION

SCOPING MEETINGS

Beginning early in 1981, the BLM conducted a series of sixteen scoping meetings with other federal, state and local agencies, the Navajo Tribe, and the general public. The purpose of these meetings was to gather information regarding the concerns of these groups on the various projects that are proposed in the San Juan Basin.

An initial mailing was made to over 3,000 agencies and individuals to distribute information about the proposals and to announce scoping meetings to the public. A follow-up mailing of nearly 2,000 letters was made to those who expressed an interest, reminding them of the meetings. These meetings were announced in the Federal Register, news releases, and radio spots in both the English and Navajo languages.

Responses to all substantive comments are included in this chapter even though a second draft EIS has been published. The purpose of including the response is to ensure that each commentor knows how their comment was handled. These comments and responses will not be republished in the Final EIS. The BLM will respond to all comments made on the second Draft EIS.

The scoping meetings held for these projects were as follows:

Agency Meetings

Albuquerque (Federal Agencies)	Monday, January 12, 1981- Albuquerque Convention Center. Eleven representatives of federal agencies including the National Park Service, Geological Survey, and Fish and Wildlife Service attended.
Santa Fe (New Mexico State Agencies)	Tuesday, January 13, 1981 - Sweeney Convention Center. Participants included the State Planning Division, Natural Resources Department, State Highway Department, State Engineer, and the Institute for Regional Education.
Farmington (County and Local Governments)	Thursday, January 15, 1981 - Farmington Civic Center. Twelve representatives of San Juan County, Farmington School District, City of Farmington, and the local Bureau of Indian Affairs office attended.

Indian Meetings

Crownpoint	Monday, January 19, 1981 - Community School House.
Lake Valley	Tuesday, January 21, 1981 - Community School House.
Huerfano	Wednesday, January 21, 1981 - Community School House.
Pueblo Pintado	Thursday, January 22, 1981 - Community School House.

Approximately 300 Navajo Indians attended these sessions. The presentations were done in Navajo.

Public Meetings

Albuquerque	Tuesday, February 3, 1981 - Albuquerque Convention Center, 145 participants.
Gallup	Wednesday, February 4, 1981 - Gallup Holiday Inn, 33 participants.
Farmington	Thursday, February 5, 1981 - Farmington Civic Center, 81 participants.
Taos	Monday, February 23, 1981 - Kachina Lodge, 58 participants.
Dulce	Wednesday, February 25, 1981 - Jicarilla Apache Tribal Council Meeting Room. Twenty-three representatives from the Jicarilla Apache Tribal Council, Jicarilla Tribe, and Bureau of Indian Affairs attended.

Summary of Scoping Meetings and Written Comments

The major issues raised at the scoping meetings included questions of procedure, purpose, need for leasing coal, leasing targets, Department of Energy

(DOE) production goals, and potential coal markets in the San Juan Basin. Major resource concerns centered around air quality, water quality and quantity, reclamation potential, paleontology, archaeology, wilderness, social Navajo issues (religion, occupancies, sacred sites, gravesites, influx of non-Navajos into the area, and health and safety on the Navajo Reservation), socio-economics (jobs, timing of jobs, revenue, effects on community infrastructure), increased traffic on roads, and wildlife. Navajo, local, and state governments also expressed an interest in being kept informed and included in the EIS process, and a need for more public meetings was voiced.

A more detailed description of the major issues is included in Chapter 1.

ISSUES NOT ADDRESSED IN THIS DEIS

Certain issues are beyond the scope of this EIS, or the jurisdiction of the BLM, or are dealt with in other environmental documents. A few of these isues are listed below.

1. It was suggested that this EIS analyze the impacts of making more efficient use of existing energy sources and of obtaining alternate energy sources. The issue of federal coal leasing and development to meet national energy needs was previously addressed in the Final Environmental Statement: Federal Coal Management Program (USDI, BLM 1979a). Development of coal does not preclude the emphasis placed on conservation and alternate energy sources.

2. It was also recommeneded by the public that this EIS identify existing and potential projects in the region that would add to the impacts from coal mining. Federal projects that have existing approval and are located in or near Preference Right Lease Applications (PRLAs) and competitive coal lease tracts are analyzed in Chapter 3 of this EIS.

3. The public feels that the allocation and availability of water for all uses in the region should be examined. Water allocation is beyond the scope of this EIS. Allocation and availability of water in the region is determined by the New Mexico State Engineer. Water used in the coal mining and reclamation process may not be available for other uses.

4. It was recommended that coal market and coal transportation analyses be prepared prior to leasing. The need for leasing addressed in this EIS is based in part on production goals from the DOE; these goals are the result of a process that is esentially a market analysis. The DOE goals include consideration of transportation costs and capabilities for developing coal in the western United States. Transportation and end use localities were taken into consideration to the extent possible when analyzing impacts in Chapter 3.

CHACO/SAN JUAN MANAGEMENT FRAMEWORK PLAN

This BLM planning effort has benefited from a high level of public participation from the outset. Comments on the implications of coal-related land use planning in the Chaco Planning Unit have been provided by numerous groups and individuals at the national, state, regional, and local levels.

Public participation activities sponsored by the BLM have also been used to obtain input from rural residents of the potentially strippable coal zone. Because these people are primarily Navajos living in relatively isolated circumstances, who to some degree are ineffectively represented by conventional political systems, some parts of the public involvement effort were tailored to their needs.

During earlier stages of the planning process, "open houses" were held at Pueblo Pintado, Nageezi, Crownpoint, Lake Valley, Gallup, Grants, Farmington, and Albuquerque to receive guidance from the public. Field interviews were conducted, and an active outreach program was carried out over a 16-month period, responding to requests from groups for presentations on the issues involved. The BLM also distributed an information sheet on work in progress and a pamphlet ("Coal in the Chaco-San Juan") that included a mail-back comment form.

Special opportunities were provided to allow public input on what the BLM's land use recommendations should entail. Called "public brainstorming sessions," these meetings produced some suggestions that have been reflected in the BLM recommendations presented here.

Opportunities for public review of this planning effort in its later stages were also established, including open houses in Pueblo Pintado, Lake Valley, Huerfano, Farmington, Albuquerque, and Taos. Attendance at these open houses was approximately 1,300 individuals; 326 letters were also received. Much of this public input was responsible for the recommendations and changes made during the land use planning process.

SURFACE OWNER CONSULTATION

Under the terms of the Surface Mining Control and Reclamation Act required before lease sale of 1977 (SMCRA) (30 USC 1201; 91 Stat. 445), consent of a qualified surface owner before mining of federal coal by surface methods when this coal underlies the privately owned surface. The Preference Right Lease Application (PRLAs) predate passage of SMCRA, so surface owner consent is not required for surface mining on the PRLAs. However, this consent is required on the competitive tracts. As an initial step in determining the views of potentially qualified surface owners, the Farmington Resource Area Office mailed out 1,143 certified letters to owners of 130 individual allotments. (Refer to Appendix H for the text of this letter.) Fifty-four of these allotments are held in individual ownership and 76 are held in multiple heirship.

In a letter to the BLM dated November 21, 1981, the Chairman of the Navajo Tribal Council stated that the Council's position is that the Navajo Nation fulfills the requirements as a qualified surface owner for trust and fee lands of the Navajo Nation and for lands on which the Nation holds state or federal grazing leases. The Council has also taken the position that Navajos residing on lands withdrawn for Indian use under P.L.O. 2198 (refer to the Glossary) are qualified surface owners. The BLM State Director wrote a response to this letter on December 24, 1981, explaining that neither the tribe nor individual Navajos living on P.L.O. 2198 lands were qualified surface owners under the definition of 43 CFR 3400.0-5 (1980). The Navajo Tribe has not responded to this letter.

Various views towards proposed surface mining have been expressed in writing by individual Navajos and Navajo governmental bodies, some of whom may be found to be qualified surface owners within the meaning of SMCRA. The BLM has received 240 responses to the certified letters that were mailed. Of this number, 180 reflect a willingness to allow the federal government to include their lands for future coal development, 41 oppose the inclusion of their lands, and 19 are unsure. The Navajo Tribe has refused consent for surface mining. Seven chapters have also expressed opposition, including Little Water, Nageezi, Huerfano, Torreon, Lake Valley, Ojo Encino and Pueblo Pintado, and a similar position has been expressed by the Chaco Lejin Energy and Resource Committee.

REVIEW OF THE DEIS

This section briefly outlines the steps taken to ensure that the public was provided with an adequate opportunity to participate in the November 30, 1982 DEIS comment process.

Comments on the DEIS were requested from the government agencies listed in Table 4-1 as well as special interest groups and members of the general public.

FORMAL PUBLIC HEARINGS

Public hearings were scheduled to provide a forum for oral testimony on the DEIS. The public was informed of these hearings through notice in the Federal Register, news releases, and postings of specific hearing dates.

Table 4-2 summarizes the dates, locations, attendance, and number of individuals that testified at these hearings. Due to their length, hearing transcripts are not reproduced here, but the complete transcripts are available for public inspection at the Albuquerque District Office, Farmington Resource Area Office and New Mexico State Office in Santa Fe.

The U.S. House of Representatives Interior Subcommittee on Mining, Forest Management, and Bonneville Power held a field hearing in Santa Fe, New Mexico on May 21, 1983. The transcripts of testimony received at that hearing are available for public inspection at the Albuquerque District, Farmington Resource Area and the New Mexico State Office in Santa Fe. These transcripts are a part of the administrative record of this EIS.

CHAPTER HOUSE MEETINGS

At the request of the Bureau of Indian Affairs (BIA), Chapter officials, concerned publics and special interest groups, a series of informal Chapter House meetings were scheduled. The intent of these meetings was to provide an informal review of the Coal EIS, solicit comments on the DEIS and to provide information regarding surface owner qualification determination, surface owner consent and refusal to consent.

Table 4-3 summarizes the dates, locations and attendance at the various meetings. The comments received are not reproduced here, but available for public inspection at the Farmington Resource Area Office. Responses to substantiative comments are taken care of through the responses to individual letters.

TABLE 4-1

DOCUMENT RECIPIENTS

Federal Government

Department of Agriculture
- *Soil Conservation Service
- *U.S. Forest Service

Department of the Army
- *Corps of Engineers

Department of Energy

*Department of Housing and Urban Development

Department of the Interior
- *Bureau of Indian Affairs
- *Bureau of Mines
- *Bureau of Reclamation
- *Minerals Management Service
- *National Park Service
- *Office of Surface Mining, Reclamation and Enforcement
- *U.S. Fish and Wildlife Service
- *U.S. Geological Survey

Department of Labor

Department of Transportation

*Environmental Protection Agency

Tribal Government

*Navajo Nation

*Presidents, Navajo Off-Reservation Chapters
- Crownpoint
- Huerfano
- Lake Valley
- Little Water
- Nageezi
- Ojo Encino
- Pueblo Pintado
- Torreon

*Director, Navajo Tribal Land Administration

Local Government

San Juan Regional Committee

County Commissions
- McKinley County
- Sandoval County
- *San Juan County

Local Government (Cont'd)

McKinley County
- Planning Department
- Soil and Water Conservation District

Sandoval County
- Planning Department
- Soil and Water Conservation District

*San Juan County
- Planning Department
- Soil and Water Conservation District

State Government

*State of New Mexico

*Bureau of Mines and Mineral Resources

*Commerce and Industry Department
- Economic Development Division

*Department of Finance and Administration
- Planning Division
  - Coordination/Clearinghouse Bureau
- Historic Preservation Bureau
  - State Historic Preservation Officer

*Energy and Minerals Department
- Mining and Minerals Division
  - Coal Surface Mining Bureau

*Governor Bruce King

*Health and Environmental Department
- Environmental Improvement Division

*Highway Department

*Land Office

*Natural Resources Department
- Department of Game and Fish
- Soil and Water Conservation Division
- Water Resources Division
  - State Engineer

Other States

Arizona Clearinghouse
Colorado Clearinghouse
Utah Clearinghouse

*-Agencies that provided comments on the DEIS.

TABLE 4-2

SUMMARY OF PUBLIC HEARINGS ON THE
DRAFT SAN JUAN RIVER REGIONAL COAL ENVIRONMENTAL IMPACT STATEMENT

DATE	TIME	LOCATION	ATTENDANCE	NUMBER TESTIFYING
10 January 1983	1:00 p.m.	Crownpoint	130	25
12 January 1983	9:00 p.m.	Farmington	115	34
14 January 1983	9:00 a.m.	Albuquerque	200	58
14 March 1983	9:00 a.m.	Santa Fe	80	29
17 March 1983	10:00 a.m.	Pueblo Pintada	200	33
		TOTALS	725	179

TABLE 4-3
SUMMARY OF INFORMAL SURFACE OWNER
CONSULTATION MEETINGS

DATE	LOCATION	ATTENDAMCE
27 December 1982	White Rock	60
13 January 1983	Crownpoint	28
14 January 1983	Crownpoint	32
17 January 1983	Redrock	16
19 January 1983	Ojo Encino	19
21 January 1983	Huerfano	81
23 February 1983	Redrock	40
2 March 1983	Ojo Encino	11
3 March 1983	Huerfano	21
4 March 1983	Crownpoint	7
*11 April 1983	Lake Valley	25
*21 April 1983	Counselor	35
	TOTAL	375

*Meeting was requested after the April 8, 1983 comment period.

TABLE 4-4

SUMMARY OF INFORMAL OPEN HOUSES

DATE	TIME	LOCATION	ATTENDANCE
14 December 1982	3:00 p.m.	Albuquerque	50
14 December 1982	3:00 p.m.	Farmington	120
15 December 1982	3:00 p.m.	Crownpoint	150
16 December 1982	3:00 p.m.	Gallup	60
16 December 1982	3:00 p.m.	Taos	50
		TOTAL	380

OPEN HOUSE

A series of five informal open houses were scheduled to provide a forum for informal review and solicitation of questions or comments on the DEIS or other coal development related topics.

Table 4-4 summarizes the dates, locations and attendance at the various open houses. The comments received are not reproduced here, but available for public inspection at the Farmington Resource Area Office. Responses to substantiative comments are handled through responses the individual comment letter found in this section.

WRITTEN RESPONSES

In addition to the oral and written comments received from the above described meetings, a large number of responses were received based upon the mailing of approximately 1,500 copies of the DEIS to various Federal, State and local agencies, Indian Tribes, special interest groups and the public in general. Table 4-5 is a list of the individual or groups who commented on the San Juan River Regional Coal EIS. Approximately 200 individuals responded that were not in attendance at a formal hearing or informal meeting.

SUMMARY OF (DEIS) COMMENTS

The following is a brief summary of the written and oral comments received on the November 30, 1982 DEIS. Federal agencies generally found the document to be adequate, however, several agencies contributed additional information on mineral resources, reclamation, air, wildlife and cultural resources that they believed should be included before a decision is reached.

New Mexico State agencies experessed a concern with the overall adherence to the National Environmental Policy Act, 1969 (NEPA), the coal regulations (43 CFR 3400), treatment of Preference Right Lease Applications (PRLAs), determination of Fair Market Value, determination of commercial quantities, geologic and paleontological resources, cultural resources and irreversible impacts to Native Americans.

Local government responses generally reflects a positive attitude toward development of the coal resource, however, concern was expressed with the potential of social services and public facility shortages.

The Navajo Tribe, BIA, Chapter officials and local Navajo populous have expressed numerous concerns as well as opposition against development. Comments reflect concerns on the effects of development upon traditional Navajo religion, increases in population, the cost of living, social service needs, job preferences for Navajos, and hardships of family relocation. Several legal issues have also been raised with regards to water rights in the San Juan Basin, qualified surface owner determinations, Navajo-Hopi Indian Relocation Amendments Act of 1980, Public Land Order 2198, Executive Order 709 and 1000, Uniform Relocation Assistance Act, the American Indian Religious Freedom Act, issuance of PRLAs, power plant justification and Bureau proposed land exchanges.

Comments from individuals and special interest groups represented a continuity from pro - to anti-mining (development) positions. Most comments

expressed a deep concern for the need of large scale coal leasing and development, socio-economic impacts on American Indians, protection of paleontological resources, archeological sites, reclamation, water and proposed wilderness areas.

This summary by no means cover the content of all comments received but provides a broad overview. Five-hundred and fifty-four (554) individuals have made 2,472 remarks on the content of the DEIS, 642 are substantive and will require a response. There was a total of 363 inputs i.e. letters, petitions, hearings, etc. received on the contents of the DEIS.

COMMENTS AND RESPONSES

Because of the large volume of material and the existence of four separate BLM teams associated with the SJBAP documents, a centralized system of receiving and distributing public comments was developed. The BLM's NMSO Public Affairs Staff was the initial point for all inputs (letters, hearing transcripts, petitions). This staff performed the initial evaluation of all inputs, associating them with the appropriate SJBAP document and marking the comments within each input. After this initial evaluation, inputs were distributed to the individual teams responsible for each SJBAP document for formal analysis of substantive comment.

Overall, approximately 537 inputs from 923 commentors were received on the four San Juan Basin Action Plan documents. Because well over 3,000 pages of hearings testimony, comment letters, petitions, and meeting notes were received, individual response to and reproduction of each substantive comment received would result in documents that were too large and not cost-effective (consideration mandated by the National Environmental Policy Act regulations). However, the comment letters from Federal, State, Local agencies, environmental groups and a representative sample of private letters has been included in volume 2 of this document. Therefore, similar comments were grouped and one summarizing comment developed for each group of similar comments.

The following section contains substantive excerpts from oral testimony given at the public hearings and open houses, written exhibits presented at those meetings, and all letters received in comment on the Draft EIS. Specific comments on the Draft EIS are listed numerically with BLM response following the comment.

Table 4-5 lists all of the individuals or groups, numerically, that submitted inputs on the DEIS. An individual assigned number can be cross-referenced with the list of specific comment or similar comments to see BLMs response to their particular concern.

All substantiative comments were considered and responses were made to comments that presented new data, question facts or analyses, or raise issues bearing directly upon the environmental effects of the proposed actions or the alternatives to the proposed action. In some cases these responses entailed revisions in the DEIS text.

TABLE 4-5

LIST OF COMMENTORS

No.	Commentors	Date	Response Required	Purpose and Need	Authorizing Actions	Alternatives	Reclamation/ Soils	Affected Environment	Environmental Impacts	Mitigation	Realty	Vegetation	Wildlife
1	Dr. E.A. Scholer	120782	No							X			
2	Emery Arnold (RDA)	121582	No										
3	Richard Perkins	121382	No										
4	James V. Lewis*	121582	No				X						
5	Ted Koenig (BIA)	122182	No										
6	John M. Crowl	122182	No				X					X	X
7	James R. Wolf	010383	Yes										
8	Rich Becker	010483	No	X					X				
9	BOR	011783	Yes										
10	David Freeman	011483	No				X						
11	Linda Seese	011783	No										
12	Thomas Austin	011683	Yes				X						
13	Millie E. Francis	122982	No										
14	Margaret McBride		No										
15	Frank Kottlowski	011283	No										
16	Robert Burham	011183	No										
17	Harold Olson	010783	Yes										X
18	John M. Hill	010683	No	X									
19	Hal Simpson	122382	No										
20	Mark & Becky Watson		No	X									
21	Elizabeth Engel		No										
22	Aztec COC	011283	No										
23	Sherry Nelson	012383	No										
24	Walton Hawk	012283	No							X			
25	David M. Brugge*	012383	Yes				X						
26	Victor J. Hancock	012483	Yes										
27	Patricia D'Andrea*	011483	No	X			X						
28	Daniel Allan	011983	No						X				
29	NOAA-Joyce Wood	012183	Yes										
30	D. Richman/L. Goin		Yes										
31	Bill McGregor	011283	No										
32	Ike Halliday*	" "	No										
33	Michael Daly	" "	No										X
34	Jim Moore	" "	Yes										
35	Samuel C. Harrison	" "	No									X	
36	Hank Pohlman*	" "	No										
37	Franklin Roberts	" "	No										
38	Jane Ben	" "	No										
39	Allison Monroe*	" "	Yes	X	X							X	
40	Ernest Beleen	" "	No										
41	George Yazzie*	" "	No										
42	Lee Norberto*	" "	No	X								X	
43	Isabel Pioche	" "	No										
44	Frank D. Sandoval	" "	No										
45	Eugene Harrison*	" "	No	X			X					X	
46	Johnson Craig	011083	No				X						
47	John Perry, Jr.	" "	No										
48	Tom B. Becenti	" "	No				X						
49	Lincoln Perry	" "	No										
50	Raymond Arviso	" "	No										
51	Esther Marian	" "	No										
52	Velma Arviso	" "	No										
53	Robert Long	" "	No										
54	Carol Kaping	" "	No										
55	Jerry Elwood*	" "	No										
56	Frank Chee Willetto*	" "	No										
57	Dr. Robert Williams	" "	No										
58	John Martinez	" "	No				X					X	
59	Billy Chiquito*	" "	No										
60	Carol Garner	" "	No	X						X			
61	Mary E. Wojtasiewicz	" "	No						X				X
62	Brain Chanatry	" "	No								X		
63	Donna Snyder	" "	No			X					X	X	
64	Paul Fyfe*	" "	Yes	X		X				X			
65	Leonard Tsosie*	" "	No							X			
66	Mimi Lopez*	" "	No	X		X	X				X	X	
67	Scott Portman*	" "	No				X					X	
68	John Sledd*	" "	No	X			X					X	
69	Southwest Research	" "	No								X		
70	Raymond Lancer	" "	No										
71	Johnny Thompson	" "	No										
72	Evelyn Saucier*	" "	No	X		X							
73	Dave Glowka	" "	No	X			X			X			
74	Jim Cannon	" "	No	X		X							
75	ABCE	" "	No	X									
76	Klara Kelley	" "	No							X			
77	David Steele	" "	No										
78	Richard Ray	" "	No										
79	M.M. Conrad	" "	No	X									
80	Arch McCallum*	" "	No	X		X							
81	D. Marcus	" "	No	X									
82	Cecil Werito*	" "	No										
83	Paul Robinson	" "	Yes				X						
84	Jennifer Skeet	" "	No				X						

*Multiple Submission(s)
H=Hearing Transcripts

	Water Quality/ Quantity	T&E Species	Air Quality	Geologic Setting & Hazards	Mineral Resources	Paleo	Cultural Resources	Visual Resources	Recre-ation	Wild-erness	Trans-portation	Social/ Eco-nomics	Indian Concerns	Edit	Miscellaneous
1							X								X
2															X
3															X
4															X
5															X
6						X			X						X
7									X						
8															X
9															X
10															
11															X
12															
13															X
14										X					X
15						X									
16															X
17															
18	X		X			X	X								X
19	X														
20															
21	X		X												X
22															X
23															X
24						X						X			X
25													X		X
26															X
27	X											X			X
28															X
29			X												
30						X									
31															X
32															X
33			X			X									X
34												X			X
35													X		X
36															
37															X
38					X										X
39					X								X		X
40															X
41													X		
42													X		X
43												X	X		X
44												X	X		X
45													X		X
46													X		X
47	X											X	X		
48													X		X
49															X
50													X		X
51															
52		X											X		X
53													X		
54													X		
55															X
56													X		X
57													X		
58															
59															X
60												X			X
61			X			X			X			X	X	X	X
62	X														
63	X						X					X	X		X
64												X		X	X
65													X	X	X
66	X												X		X
67															X
68	X		X											X	
69												X			X
70													X		X
71															X
72															
73													X		X
74															X
75															X
76							X					X	X	X	X
77															X
78															
79															
80													X		X
81															
82													X		
83															
84	X						X						X		X

TABLE 4-5 (continued)

No.	Commentors	Date	esponse Required	Purpose and Need	Author-izing Actions	Alter-natives	Recla-mation/ Soils	Affected Environ-ment	Environ-mental Impacts	Miti-gation	Realty	Vege-tation	Wild-life
85	Bart Barbour	011083	No										
86	Bill Melfi	" "	Yes										
87	Don Sargent	" "	No										
88	Jim Melfi	" "	No			X							
89	Barry Kues*	" "	Yes							X			
90	Frank McGuire*	" "	No										
91	Nancy Wood	" "	No										
92	Russ Butcher	" "	No										
93	Rob Morse	" "	No										
94	Mary Lou Ashwill	" "	No										
95	Darrell Smith*	" "	No										
96	Bruce Grove	" "	No										
97	Corry McDonald*	" "	No									X	
98	John Getchell*	" "	No										
99	Lillian Tenopyr*	" "	No				X						
100	Jeff Boyer	" "	No							X			
101	Joan Price	" "	No										
102	Ellouise Jacobson	" "	No										
103	John Teague	" "	No	X		X	X						
104	Teena Ditchak-Topper	" "	No										
105	David Williams	" "	No										
106	Neil Cobb	" "	No										
107	Karen Brown	" "	No				X						
108	David Gold	" "	No										
109	Jack Kutz	" "	No	X									
110	Chapter Meetings	" "	No	X									
111	Larry Foster	" "	No								X		
112	Robert G. Roberts	" "	No										
113	Delafield DuBois	" "	No	X									
114	M. Keaveney/E. Dew	" "	No										
115	Marta Chilton*	" "	No										
116	Ron Grotbeck	" "	No	X									
117	Harry Riffenburgh	" "	No										
118	Helen S. Pine	" "	No										
119	Faye Thompson	" "	No										
120	Helen Brown	" "	No										
121	George Simpson	" "	No										
122	Alfred Chavez, Jr.	" "	No									X	
123	A. Nimas/J. Martin	" "	No									X	
124	Wilson Skeet	" "	No										
125	Harold Tidwell	" "	No										
126	Sonja delaParra	" "	No										
127	Richard Dice	" "	No	X									
128	Barry Keaveney	" "	No										
129	Anna Manana	" "	No										
130	Morton J. Mansur	" "	No										
131	Joseph Smith (BOM)	" "	No	X									
132	David Rust (DHS)	" "	No										
133	Onshore Solid Min.	" "	No				X		X	X			
134	Dan Wohl	" "	No										
135	James Daniel/USGS	" "	No										
136	Lester C. George	" "	No										
137	Joanne Forman	" "	No										
138	John Swanson	" "	No										
139	Dennis Morgan	" "	No										
140	Mr./Mrs. C. Lillery	" "	No										
141	R. Moore/Forestry	" "	No										
142	Museum of N. Ariz.	" "	No						X				
143	Phillip Brown	" "	No										
144	Susan Rich	" "	No				X						
145	Julie Yancey	" "	No										
146	Ralph Fisher	020583	No										
147	Col. Paul Sparks	020483	No										
148	Loretta Bifulco	020983	No	X			X						
149	Huerfano Chapter*		No										
150	USGS/Water Resources	021483	Yes										
151	Mr./Mrs. Eric Young	022283	No										
152	Mesilla Valley Audb.	022083	No	X			X						
153	Caroline True	021983	No										
154	Floy Barrett	022383	No										
155	Irene Gilbert	022483	No				X						
156	Craig Thompson	" "	No	X	X		X				X		
157	Roland Goodman	022683	No	X							X		
158	Walter Sydney	022783	No										
159	Betty Bowen		No	X									
160	Frank D. Gilliland	022683	Yes										
161	R. J. McLaughlin	022583	No										
162	Quigley Peterson	030183	No										
163	Shirley Phillips		No										
164	Robert S. Hoke	022383	No										
165	Kyle MacDonald	" "	No										
166	N.M. State Parks		Yes										
167	Madeline C. Vallare	022483	No										
168	Carl Martin	022283	No										

*Multiple Submission(s)
H-Hearing Transcripts
O-Open House Submission

	Water Quality/ Quantity	T&E Species	Air Quality	Geologic Setting & Hazards	Mineral Resources	Paleo	Cultural Resources	Visual Resources	Recre-ation	Wild-erness	Trans-portation	Social/ Eco-nomics	Indian Concerns	Edit	Miscellaneous
85											X				X
86					X										
87															X
88															
89						X									X
90												X			X
91							X								X
92							X			X					X
93															X
94															X
95							X								X
96													X		
97										X					
98										X					
99															X
100	X						X						X		
101															X
102						X									X
103	X		X							X			X		X
104															X
105															X
106										X					
107	X												X		X
108							X								X
109															X
110													X		X
111	X														X
112															X
113	X		X												
114													X		X
115															X
116															X
117															X
118															X
119															X
120															X
121															X
122															
123															
124													X		X
125															X
126															X
127															
128	X												X		X
129															X
130															X
131					X										X
132												X			
133	X				X	X	X			X			X	X	X
134															X
135	X														
136															X
137															X
138															X
139															X
140															X
141															X
142						X	X						X		X
143															X
144							X								X
145															X
146															X
147															X
148	X														X
149													X		X
150	X														
151	X		X			X	X								X
152						X	X						X		
153															X
154	X												X		X
155	X					X									
156										X			X		X
157															
158							X								X
159														X	
160														X	
161															
162															
163															
164															
165															
166			X						X	X					X
167							X								X
168	X														

TABLE 4--> (continued)

No.	Commentors	Date	esponse Required	Purpose and Need	Author-izing Actions	Alter-natives	Recla-mation/ Soils	Affected Environ-ment	Environ-mental Impacts	Miti-gation	Realty	Vege-tation	Wild-life
169	Jicarilla Apache	030483	Yes										X
170	Laurie McKnight		No										
171	Sy Baldwin	030583	No										
172	Janice Lucas	022383	No										
173	Gail Darling	" "	No										
174	John Hamilton		No										
175	Nancy Kleinbord*	030483	No										
176	Diane Noveroske	031083	No										
177	J.M. Krisman	" "	No										
178	Pueblo Pintada Chpt.	" "	No										
179	Sarah Irving	031183	No										
180	Susan Hill	031583	No										
181	Charlenn Cresto	031683	No										
182	Pat Denton		No										
183	Malcolm R. Peek	031583	No										
184	E. Navajo Joint LB	121782	No										
185	Crownpt. Open House	121582	No										
186	Farm. Open House*	121582	No										
187	Indian Allot. Owners	012183	No	X									
188	Sur. Own. Mtg. Red R		No										
189	San Juan County	032183	No										
190	S.J. Basin Arch. Soc	031683	No	X									
191	Melanie Williams	031683	No										
192	M'Lynne Womble-Kenny	031083	No	X									
193	USFS	031883	No										
194	Mark Watson		No										
195	Penny Vieseas	022383	No										
196	Mary Steele	031783	No	X									
197	Marron Bicowan	032183	No										
198	Prewitt/Baca Chpt.		No	X			X						
199	Dr. Harry Bishara*	031683	No			X							
200	Nina Rappaport	032183	Yes			X	X						
201	Therese Martini	022383	No										
202	Rob Frantz	032483	No										
203	Judy C. Goette	032183	No	X									
204	Linda A. Sanchez	032283	Yes				X						
205	Tish M. Steinfeld*	032583	Yes										
206	Earl Neller*	032283	No										
207	Jim Baca (NMCPL)	031883	No			X							
208	Edward T. Hall	031483	No										
209	Maria C. Lopez	" "	No	X									
210	David Marcus	" "	No	X									
211	Mara Taub	" "	No	X			X						
212	Ann Karl	" "	No										
213	Mary G. P. Hall	" "	No				X						
214	Hugh Maxwell	" "	No										
215	Jack Kendall	" "	No										
216	John Dennison	" "	No										
217	Bobbe Dyer	" "	No										
218	Miswa Lee	" "	No										
219	Jack Kenney	" "	No										
220	Carla Lopez	" "	No	X									
221	Ned Sudborough	" "	No										
222	Paul Kinslow	" "	No				X						
223	Dorothy Boynton	" "	No				X						
224	Kenneth Adam	" "	No										
225	Andrew Davis*	" "	No	X	X		X						
226	Michael Stewartt	" "	No										
227	Ms. Moo-ya	" "	No										
228	EPA	032583	Yes			X							
229	Helenty Homans	032783	No	X									
230	John W. Sanders	032883	No										
231	Mr. & Mrs. R. Wagner	032483	No										
232	Jan Holt	032683	No	X			X						
233	Zane Dohner	032883	No										
234	Elaine G. Taylor	032783	No				X						
235	Peter J. Pilles, Jr.	032783	Yes										
236	William V. Turk	" "	No	X									
237	Frankie B. Lopez	" "	No										
238	John Nez Beyale	" "	No				X						
239	John Martinez	" "	No										
240	Nancy Dennison	" "	No										
241	Bert Mescal	" "	No										
242	Bill Oliver	031783	No										
243	Herbert Blatchford	" "	No										
244	Alice Lopez	" "	No										
245	Sam Martinez	" "	No									X	
246	Joe Harrison, Sr.	" "	No										
247	William Raymond	" "	No										
248	John Mescal	" "	No										
249	Lester Tsosie	" "	No				X					X	
250	Chiquito Costello	" "	No										
251	William Dennison	" "	No										
252	Jimmie Thompson	" "	No										

*Multiple Submission(s)
H-Hearing Transcripts

	Water Quality/ Quantity	T&E Species	Air Quality	Geologic Setting & Hazards	Mineral Resources	Paleo	Cultural Resources	Visual Resources	Recre-ation	Wild-erness	Trans-portation	Social/ Eco-nomics	Indian Concerns	Edit	Miscellaneous
169	X										X	X			
170															X
171															X
172	X		X			X	X					X	X		
173	X		X			X				X		X			
174			X												
175							X					X	X		
176															
177															
178															
179	X								X						X
180							X						X		X
181															X
182															X
183															
184													X		X
185	X												X		X
186													X		X
187													X		X
188													X		X
189															X
190															
191															X
192						X	X			X			X		X
193															
194															X
195										X					
196													X		X
197															
198	X											X	X		
199													X		X
200	X		X				X								X
201						X	X						X		X
202															X
203															X
204							X						X		
205	X						X			X			X		X
206							X								
207															X
208							X								X
209													X		X
210															X
211												X	X		X
212															X
213	X		X												X
214															X
215						X						X			
216													X		
217															X
218												X	X		
219	X					X	X						X		
220															X
221															X
222												X	X		
223													X		
224															X
225										X					X
226															X
227															X
228	X		X												X
229															
230															X
231															X
232	X					X	X								X
233															X
234	X														
235							X						X		
236													X		X
237															X
238												X			X
239															X
240	X														X
241	X											X	X		X
242															X
243															X
244													X		X
245															X
246												X	X		X
247															X
248													X		X
249												X	X		X
250															X
251													X		X
252													X		X

TABLE 4-5 (continued)

No.	Commentors	Date	Response Required	Purpose and Need	Authorizing Actions	Alternatives	Reclamation/ Soils	Affected Environment	Environmental Impacts	Mitigation	Realty	Vegetation	Wildlife
253	Bill Chiquito, Sr.	031783	No										
254	Johnson Begay	" "	No										
255	Bill Lewis	" "	No	X									
256	Cecil Largo, Sr.	" "	No										
257	Joe Tom	" "	No										
258	Freddie Napoles	" "	No										
259	Kenneth Cody	" "	No										
260	K. & A. Halpern	032983	No										
261	Vila Schwindt	033083	No	X									
262	Pam Mack	" "	No	X									
263	Salt River Project	033183	Yes							X			
264	Elaine Perkins	032983	No										
265	Dr. John Bartlit	040183	No										
266	BIA/Donald Dodge	031683	Yes							X			
267	Michael Colavito	033183	No										
268	Robert W. Bell	040483	No										
269	Carolyn Crinkley		No										
270	Joan Nockels*	030483	No										
271	David K. Greene*	032883	Yes				X					X	
272	SHPO-Thomas Merlan	040483	Yes										
273	David A. Phillips	040583	No										
274	Trudy Berman	040383	No	X									
275	Bruce Berman	040483	No										
276	Wallace Schultz		No										
277	Alice Frank	040283	No										
278	Dr. Joanne Sprenger	" "	No										
279	Ken Marron	040483	Yes									X	
280	Larry Frank	040283	No										
281	Heister H. Drum	040483	No										
282	Barbara Waters	040283	No										
283	Charles Coffman	032183	No										
284	Crpt. Citizen Alli.	040483	No										
285	Alice Ramone	033083	No										
286	Dickie Antonio	033083	No										
287	Ojo Encino Chapter	030283	No										
288	Kate Bradley	040583	No										
289	N.M. Arch. Council	033183	Yes				X			X		X	
290	U.S.F. & W. Service	040683	Yes				X			X			X
291	Fred S. Hanselmann	040483	No	X		X							
292	Milo Conrad	040583	No										
293	Randy Albright	040483	Yes				X						
294	AREA-P. Wainwright	040683	Yes										
295	Carlos R. Cisneros	011383	No										
296	Santa Fe Chpt. Arch.	031483	No										
297	Western Network	040583	Yes										
298	Algie M. Dufaux		No										
299	Dixon Community	040583	Yes			X	X			X		X	X
300	Navajo Nation - Zah	040683	Yes	X	X	X	X			X	X		X
301	Margaret Powers	040383	Yes										
302	S. Deb Misra P.E.	040683	Yes	X									
303	Cory D. Breternity	040483	Yes										
304	Stephen LeCuyer	040483	Yes	X		X							
305	Jane Chromy	032983	No										
306	Dee J. Montano	040583	No										
307	Bruce Martin	040583	No	X									
308	Jill Seyfarth*	040483	Yes										
309	Envir. Defense Fund	040783	Yes	X		X			X		X		
310	Friends of the Earth	040883	Yes	X						X		X	
311	Nat. Res. Defense	040783	Yes			X	X		X	X		X	
312	Dee Homans	" "	No	X									
313	Jeffrey Henry	" "	No										
314	Pitt.-Midway Coal Co	040683	No										
315	Mark Franklin	040583	No										
316	SW NM Sierra Club	" "	No										
317	Edward B. Burns	040783	No										
318	Marilyn Swift	" "	No										
319	Stephen Studebaker	040483	No				X						
320	Wendy Allen	040183	No										
321	SF Coal Corp./Byers	040683	Yes		X		X			X		X	X
322	Kent M. Redding	040783	No										
323	Mary L. Merkel	" "	No										
324	Pam Corazzi	" "	No										
325	Mrs. W.W. Hanks	" "	No										
326	Dorothy Beatty, DDS	" "	No	X									
327	Judith Jenkins, DDS	040483	No										
328	State of New Mexico	040883	Yes			X	X		X	X		X	X
329	Nat. Coal Assoc.	040783	No										
330	Rio Grande Sierra	040883	Yes	X		X	X					X	X
331	David Benavides	" "	No				X						
332	Sharon P. Murray	040783	Yes										
333	Rosalind McClellan*	040483	Yes	X			X						
334	R. & J. Gauthier	040683	No										
335	Roberts/Sierra Club	040883	Yes	X		X	X			X			X
336	N.P.S./Heyer	" "	Yes							X			

*Multiple Submission(s)
H-Hearing Transcripts

	Water Quality/ Quantity	T&E Species	Air Quality	Geologic Setting & Hazards	Mineral Resources	Paleo	Cultural Resources	Visual Resources	Recre-ation	Wild-erness	Trans-portation	Social/ Eco-nomics	Indian Concerns	Edit	Miscellaneous
253													X		X
254													X		X
255													X		X
256															X
257															X
258	X												X		X
259													X		X
260							X						X		X
261	X					X				X			X		X
262	X		X			X	X								X
263							X						X		X
264						X	X								X
265			X												
266															
267															X
268															X
269															X
270	X														
271	X		X	X		X	X		X	X	X		X		
272							X								X
273							X								
274															X
275															X
276															X
277															X
278															X
279															
280															X
281															X
282			X												X
283															X
284															X
285															X
286															X
287															X
288												X			X
289	X						X					X	X		X
290	X								X						X
291						X	X			X					X
292															X
293	X				X	X	X	X					X		X
294				X								X	X		X
295															X
296															X
297	X														X
298															X
299	X		X			X	X		X	X		X	X		X
300	X		X	X		X	X	X				X	X		X
301							X								X
302													X		X
303							X						X		X
304							X				X		X		X
305															X
306															X
307															X
308							X								X
309	X				X				X	X	X	X	X	X	X
310			X		X	X	X	X	X			X	X		X
311	X		X				X	X	X	X	X		X		X
312													X		X
313															X
314															X
315	X		X			X	X					X	X		X
316							X								X
317						X	X								X
318							X						X		
319							X		X				X		X
320			X				X						X		X
321	X		X		X	X	X		X			X	X		X
322															X
323															X
324															X
325															X
326															X
327															X
328	X		X		X	X	X		X	X	X	X	X	X	X
329															X
330	X		X	X	X	X	X	X			X	X	X		X
331															X
332												X			X
333							X					X			X
334															X
335	X		X	X	X	X	X		X	X			X		X
336	X		X		X		X		X		X		X		X

TABLE 4-5 (concluded)

No.	Commentors	Date	esponse Required	Purpose and Need	Author-izing Actions	Alter-natives	Recla-mation/ Soils	Affected Environ-ment	Environ-mental Impacts	Miti-gation	Realty	Vege-tation	Wild-life
337	Carolyn Dailey	040583	No	X									
338	Roger S. Peterson	040683	No										
339	Katheline King	030783	No										
340	Timothy Kerns	040783	Yes										
341	Donald R. Sciame		No										
342	Bureau of Reclam.	040883	Yes										
343	Marcus A. Wiley	040783	No										
344	Barry Rhea		No										
345	Stephen G. Goodrich	040583	Yes									X	
346	J.B. Mulcock, Jr.	040683	Yes										
347	Navajo Nat./Eberhard	040883	Yes										
348	M. M. Koponer		No										
349	Navajo Tribe/Dehiya	040883	Yes				X			X			
350	N. M. Trans. Dept.	041183	No										
351	Paula Seaton	040683	No										
352	Carl Weston		No										
353	Cheryl Brandsma	040683	No										
354	Emery Arnold/RDA	041883	No										
355	Tamara Wiggans	040683	No										
356	R. Jackson/Sunbelt	040583	No				X						X
357	O.S.M./Allen Klein	040883	Yes				X						
358	O.S.M./Richard Dawes	" "	No										
359	Barry Welch/BIA	042583	No										
360	Lake Valley Chpt.	041183	No										
361	Bread Springs Chpt.		No										
362	Scott Portman	011283	Yes				X						
363	Robert Norhaus	" "	Yes										

*Multiple Submission(s)
H=Hearing Transscripts

	Water Quality/ Quantity	T&E Species	Air Quality	Geologic Setting & Hazards	Mineral Resources	Paleo	Cultural Resources	Visual Resources	Recre-ation	Wild-erness	Trans-portation	Social/ Eco-nomics	Indian Concerns	Edit	Miscellaneous
337	X						X								X
338															X
339															X
340							X						X		X
341															X
342	X														
343															X
344							X		X						X
345												X	X		X
346			X				X								
347	X												X		X
348															
349	X						X				X	X	X		X
350															
351	X					X							X		X
352															
353															
354															
355															
356	X					X		X	X	X		X			X
357															
358															
359															
360															
361															
362															
363												X			

AIR QUALITY

1.1 (29) Information on the particle size distribution that is generated during coal mining operations is needed to evaluate this problem.

Actual data on particle size is not available for the proposed mines in the San Juan Basin. A survey conducted on fugitive dust from coal mines for EPA by PEDCO (1978) indicates that the mass median diameter of particulates is in the range of 10-35 microns. Based on this study, it is not expected that a significant fraction of the generated particulate matter would be sub-micron in size.

* * *

1.2 (29) Climatological data far beyond what is said on page 2-2 of the EIS is needed to evaluate an impact of the proposed coal mining operations on air quality. George Holzworth of EPA has published data on mixing heights for winter and summer that should be looked at in this regard.

The impacts to air quality were evaluated using the CDMQC model. The imputs to this model include wind speed, direction, and atmospheric stability in the form of a Stability Array (STAR) program. The CDMQC model and Stability Array program are discussed in air quality reports which are on file in the Farmington Resource Area Office.

* * *

1.3 (29) ...no consideration is given to an impact of this increased traffic on the regional air quality...Also gases will be of consequence to air quality.

Traffic increases as indicated in Table 3-8 of the DEIS are not considered significant for most roads in the area except for NM 44 and NM 371 in the Target and High leasing alternative levels in the year 2000. Impacts that might be associated with the traffic increases for NM 44 and NM 371 in the year 2000 are considered to be insignficcant as is noted in paragraph 2 on page 3-5 of the DEIS.

Regional air quality must consider an increase in traffic for all roads in the basin. Much of this increase would not be related to the proposed coal development. Due to the greater geographic area covered, the emissions would be diluted and less significant than stationary sources. Because of these factors, the statement is made on page 3-5 that the "Impacts of other pollutants (sulfur dioxide, nitric oxide, nitrogen di-

1.3 (cont.) oxide, carbon monoxide, non-methane hydrocarbons, ozone, and lead) would be immeasureable on a regional scale and insignificant.

* * *

1.4 (29) The largest impact on air quality, and possibly climate, will result from the subsequent utilization of the coal.

This EIS is limited to analyzing the impacts that could occur from mining federal coal offered through Preference Right Lease Applications and competitive coal leases. Impacts resulting from the utilization of coal would be analyzed for projects proposing to use coal, such as the analysis conducted in the DEIS for the proposed New Mexico Generating Station and Possible New Town (USDI, BLM 1982).

* * *

1.5 (99) ...I can find no statement concerning annual rainfall in inches.

The statement is made on page 2-1 of the DEIS that "The annual precipitation varies between 10 and 14 inches;...."

* * *

1.6 (166) Contributions to "regional haze" and decrease of visual range and related adverse impacts to the environmental quality of the region should be couched in terms of impacts to recreationists and wilderness users vs. comparisons to air quality "standards" ...

We are required by law to conduct environmental analysis to determine if violations to air quality standards would occur as a result of coal mining. Consideration must also be given to identifying air quality impacts that would detract or diminish recreational or wilderness experiences. Impact analysis is not structured to identify and analyze resource impacts versus other resource impacts. Impacts are identified and considered for all resource components. Cumulative resource impacts are then identified and analyzed by alternative. Analysis of air quality impacts to the recreation or wilderness user were not determined to be significant and are, therefore, not included in the EIS.

* * *

1.7 (228) The EIS needs to clarify the statement on page 3-7 regarding the Prevention of Significant Deterioration (PSD) baseline. ...BLM should recognize that future mining activity and its as-

1.7 (cont.) sociated fugitive particulate emissions will consume increment. The EIS should discuss the impact of this on future industrial growth within the affected areas.

This information is not essential for a reasoned choice among the alternatives.

* * *

1.8 (299) Information about resulting air quality is misleading and inadequate. The DEIS states that the "visual range will be reduced by 8%-56% above background" (p. 3-5), but "background" includes existing pollution (p. 3-3). We are left uninformed about the likely resulting air quality.

The proposed development would reduce the existing visibility from 73 to 67 miles on an annual basis. The short-term (24-hour) reduction would be from 73 miles to 32 miles. These figures represent the worst level of impacts projected to occur to air quality from the highest level of coal development. Development of alternate levels would result in a reduction of the impacts and areal extent of the impacts to air quality.

* * *

1.9 (311) ...a site-specific analysis was performed to determine the air quality impacts of mining on specific tracts, and that the analysis indicated three areas with potential problems. ...it does not identify those areas. It would be helpful to know which of the PRLAs have been so identified.

The three areas are the proposed competitive coal lease areas near Gallup, Kimbeto, and Crownpoint-Lee Ranch. PRLAs are not within any of these areas.

* * *

1.10 (311) The statement in the EIS that total suspended particulates (TSP) from PRLA development would not exceed PSD limitations, p. 3-5, is deleted without explanation by the errata sheet. Does this mean that some PSD limitations, such as Class II increments, would be violated by PRLA development? If yes, the EIS should so state. ...the basis for the questionable assumption that TSP has a range of only 20 kilometers (12 miles) should be provided. The EIS must demonstrate that all potential PSD violations have actually been analyzed,...

The PSD increments reference was deleted from the document because the paragraph is concerned with ambient standard and not PSD increments. See the response to comment 1.7 of this section on PSD increments.

1.10 (cont.) Analysis in the EPA study "Survey of Fugitive Dust from Coal Mines" done by PEDCo in 1978 shows that under stability class D only 17 percent of the initial emissions would remain in suspension at 10 km downwind. Additional dispersion and settling would result in a smaller concentration at 20 km.

* * *

1.11 (311) ...Table 3-1 suggests that PRLA development will not result in a TSP violation, the EIS admits elsewhere that,

> "Some short periods of local violations of air quality standards would result from mining associated activities if unfavorable meterological conditions persist for several hours." p. 3-54.

The EIS must identify the meteorological conditions that would produce these results, along with the probability, frequency and location of their occurrence, and must specify which standards might be violated.

The meteorological conditions that would result in the worst case conditions are wind speed, direction and atmospheric stability. The joint frequency of these factors were entered into the model used in the air quality analysis. The model results indicate that under the three highest alternatives there is a potential to exceed the State's 24-hour standard near some of the lease tracts. (See the ECOS report on file in BLM's state district or area offices.)

* * *

1.12 (311) What are the potential violations? Which PRLAs will be affected by this measure (p. 3-50) and what will the changed configuration cost? Who will make the determination and when?

The potential violations are discussed in the alternatives where they are projected to occur. Actual mine facilities and operations are developed and submitted in the mine plan. BLM, OSM, or State of New Mexico air quality specialists would review the mine plan. Any changes in the location of mine facilities or operations, resulting from the reviews conducted on the mine plan, would occur prior to a permit being issued on the mine plan. Costs involved would be concerned with changes in the mine plan and accompanying environmental analysis.

* * *

1.13 The second air quality measure is the self-evident statement that: "Emissions (TSP) would be reduced by decreasing the amount of coal mined and the acres disturbed per year." Id. Does this statement imply a willingness by the BLM to impose such a restriction on PRLA development? When would that decision by reached, and how would it affect the commercial viability of the affected PRLAs?

Mitigation of air quality impacts is a responsibility of the State of New Mexico. The State would determine which measures to adopt.

* * *

1.14 (321) Chaco Culture National Historical Park is not a Class I area under the Clean Air Act as the fifth full paragraph on this page (p. 3-5) represents. The park is a Class II area....

This correction was included in the errata sheet that accompanied the coal DEIS. The text has been revised.

* * *

1.15 (328) The model CDMQC used in the analysis should not be used in modeling for a rural area. Also, it is not clear if the 65 coal leases that would exist under the high alternative are correctly represented as the 20 hypothetical mines modeled. Also, the averaging of three sets of meteorological data, although perhaps necessary for a regional analysis, will not reflect the local atmospheric conditions that influence the ambient impact of emissions.

Modifications were made in the CDMQC model to consider rural air quality conditions. The modifications are discussed in the ECOS technical report that is on file in the Farmington Resource Area Office.

Locations of mine facilities and operations will not be known until this information is developed in mine plans to be submitted by the lessee. The location of the hypothetical mines and resulting emissions are based on approximate locations. The development of the hypothetical mine locations and emissions is discussed in the ECOS technical report.

* * *

1.16 (328) Questions about pollutants for which EPA has not issued criteria or regulations--such as the metals found in coals--are neglected. The concept of conservation of air resources rather than permitting one class of user to exploit them to legal limits is totally missing in the Draft.

1.16 (cont.) The non-criteria pollutants (metals found in coal) emitted from coal mines have not been shown to occur in significant quantities. Non-criteria pollutants are, therefore, not discussed i the EIS according to section 1502.2 (b) of the CEQ regulations.

See the response to comment 1.7 of this section on consumption of PSD increments.

* * *

1.17 (328) The use of TSP introduces, as we earlier noted, questions respecting particle size and chemistry. ...The character of particles from mining,...is generally neglected in the Draft.

See the response to comment 1.1 of this section.

* * *

1.18 (330) (68) The air quality discussion is not understandable to the average reader. The discrepancy between the assumed Total Suspended Particulates baseline of 30 micrograms per meter^3 (2-2) and the calculated baseline at Chaco of 7 micrograms per meter^3 (3-5) is not fully explained in the text or the errata sheet.

The value of 30 ug/m^3 is the value measured by NMEID at Zuni, New Mexico. Since data is not available at the proposed lease sites, this measurement has been applied to the EIS region. It is acknowledged that this value may not occur throughout the region. The calculated 7 ug/m^3 at Chaco Canyon was used in Ursenbach's equation to estimate the potential reduction in the NPS measured visibility.

* * *

1.19 (330) (335) The DEIS states that the Prevention of Significant Deterioration Class II 24-hour limit could be exceeded near the mine boundaries. Where is this area? What are the regulatory, visibility, or health implications of such a situation.

Hypotheticaly mine boundaries were considered in the CDMQC model. Specific mine boundaries and PSD emissions, if exceeded, would not be known until this information is presented in the mine plan submitted by the lessee. Impacts to visibility are discussed in the alternatives where significant impacts are projected to occur. (See the ECOS technical report 24-hour isopleth maps available in BLM's state, district and area offices). There are no known significant health effects.

* * *

1.20 (330) The DEIS contains no discussion of the regulatory problems or feasibility of permitting mines...in an area with an absolute PSD increment limit of 37 ug/m^3 for TSP.

See the response to comment 1.7 of this section on the consumption of PSD increment. The determination as to whether there will be regulatory problems would have to be determined by NMEID when they begin issuing permits for PSD increments. Additionally, a determination has not been made as to whether NMEID will require PSD permits for coal mines.

* * *

1.21 (330) The EIS should explicitly state that the target alternative results in the halving of visibility at Chaco (from 127 to 65 miles).

The text has been revised to show a visual reduction of 73 to 60 miles near the Park. This figure was calculated by using Ursenbach's equation and model procedures presented in Appendix G. A short-term and annual visual reduction of three and 18 percent respectively is projected to occur at this visual reduction range. Calculation of the Park Service's 127 mile visibility figure in Ursenbach's equation resulted in a short-term and annual visual reduction of seven and 23 percent respectively. This resulted in 98 miles being projectd at the low end of the visual reduction range. Therefore, the visibility of the park would be from 127 to 98 miles and not the 65 miles as indicated. It should be remembered that this is a conservative worst case estimate of visibility reduction.

* * *

1.22 (68) The Clean Air Act will be violated without mitigation measures. 3-40; x. The only mitigation discussed is to alter mine locations and decrease mining, 3-50. If decreased mining will be enforced to comply with the Clean Air Act, production estimates should be decreased. If no such mitigation will be required, how will BLM ensure compliance with 30 U.S.C. 201 (a) (3) (E), requiring leases to abide by the Clean Air Act?

At the mine plan stage, prior to mining, data on size and production will be available. The OSM will re-analyze the impacts on air quality. The OSM, in cooperation with the State of New Mexico, will require measures to protect air quality. NMEID will require definite emmission data prior to issuing a permit. The NMEID and EPA monitor mining operations for compliance with lease stipulations to ensure state and federal clean air standards are maintained.

* * *

1.23 (68) Realistic 24-hour impacts could be obtained. 3-5. Will they be?

Air monitoring stations will be established at the mine plan stage by the lessee, in accordance with federal and state regulations to monitor air quality. Establishment of these stations will provide the data required to identify projected 24-hour air quality impacts.

* * *

1.24 (335) The evaluation of air quality issues is extremely confused and not intelligible to the average reader. It appears that the combination of the PRLAs and competitive lease (target alternative) would increase total suspended particulates (TSP) by 234 ug/m^3. (Table 3-1). This, added to the base TSP of 30 ug/m^3 (p 2-2), would appear to cause a violation of the New Mexico TSP 24 hour standard. However, there is no discussion of where the violation would occur and what the effects would be.

The areas of potential exceedance of the TSP 24-hour standard are shown in the 24-hour isopleth maps in the ECOS report. The values listed in Table 3-1 include back ground values. The 30 ug/m^3 is an annual average, not a 24-hour average.

* * *

1.25 (336) ...the analysis in the draft environmental impact statement (EIS)...is especially deficient in that it does not provide a decisionmaker or the lay reader with a real sense of what "worst case" analysis means. It does not provide an analysis showing what the potential emissions could be if mitigation measures were to be applied. Specific mitigating measures are not provided, nor is there any quantification of the percent reduction in TSP emissions that could be anticipated using specified techniques.

The "worst case" is an estimate of the emissions using estimated emission data and a mine facilities configuration and meterology conditions to predict the maximum potential ambient concentrations. This does not mean that this is the actual conditions that will occur during development. Additional modeling should be done at the mine plan stage when more information is available to determine what mitigation measures would be needed. It is too remote and speculative at this time to try and identify actual air quality conditions. Short term violations, if any, would be the exception through the enforcement of legal and regulatory standards.

* * *

1.26 (336) The draft document predicts that the AAQS will be violated by each of the action alternatives; and while these predictions are presented as significant effects, no explanation is given for what those violations could mean to future development of the leases. ...Because this could affect the investment decisions of potential lessees, the draft should provide further information and analysis on the import of the significant effects predicted.

See the response to comments 1.25 and 1.27 in this section.

* * *

1.27 (336) The relevance of the PSD question is again one of certainty for potential lessees; if there is a possibility (or even a high probability) that a tract in which a company is interested may be precluded from development because of PSD increment problems in the San Juan Basin, the EIS analysis should make this fact clear.

If the PSD increment is totally allocated within an area, additional PSD permits would not be issued, therefore, it is true that PSD may affect potential lease development. Until the PSD process is triggered it is totally speculative as to how many and which lease tracts would be affected.

* * *

1.28 (336) ...question...the contention of the EIS (page 2-2) that the coal mines are all individually exempt from PSD review requirements. ...The table shows that 11 mines exceed the 250 tons per year limit (and thus would require PSD review individually). This is in contradiction of the contention of paragraph 4 on page 2-2.

Particulates are the only pollutant generated from mining operations in large enough quantities to significantly affect air quality. PSD review by EPA and NMEID is required only when all emissions, excluding fugitive emissions, exceed 250 tons. Since the information presented in this table (Appendix G) is concerned with fugitive emissions, there is no contradiction regarding PSD review.

* * *

1.29 (336) Since PSD increments are not addressed, it is difficult to conclude that "no significant impact" would occur. Further, the term "slightly violated" is problematic. (page 1-33).

See the response to comment 1.28. The potential for NMEID total suspended paticulate (TSP) 24-hour ambient air quality

1.29 (cont.) standards to be exceeded is projected for different levels of coal development. State and federal agencies would review mine plans closely. Appropriate measures would be specified in leases and permits and monitoring plans implemented to ensure that the potential to exceed any standards does not occur.

* * *

1.30 (336) It would be useful to have explanation of the factors which would result in surface mine emissioins greater than 150 T/yr. Size? Mining method? Reclamation practices? What standards are use to estimate emissions? (page 2-2).

Acres disturbed, haul roads, and coal production are the main factors used to determine the mine emissions. These are discussed in more detail in the technical reports (PEDCo and ECOS) on file at BLMs state, district and area offices.

* * *

1.31 (336) The reduction of visual range should be given as "reduced to 65 miles from 127 miles." Further, a comment on the significance of this reduction should be given. ...Some quantification of the losses in visibility are necessary. (page 3-27).

The text has been revised. See the response to comment 1.21 of this section.

* * *

1.32 (336) The Minimum Surface Owner Conflict Alternative visibility is expressed as an average visual range of 60 miles. There is no corresponding figure given for the target alternative; and for the High alternative, it is given as 60 miles. There should be some explanation as to how it is possible to quadruple coal production from 7.15 million T/yr. to .24 billion T/yr. with no changes in visibility as defined by average visual range and no changes in predictions of AAQS violations. (page 3-45).

The text states that the impact would be over a greater areal extent. This is also shown on the isopleth maps in Appendix G-1. The additional mines are in other sections of the EIS region and there would be little interaction between the areas.

* * *

1.33 (336) The mitigating measures section for air quality is generally inadequate. ...Specific methods--road paving, use of surfactants, requirements for accelerated seeding and establishment of vegetative cover--should be proposed with attention given to the percent of reduction in total emissions that each proposed technique would provide. (page 3-50).

1.33 (cont.) See the response to comment 1.22 in this section.

* * *

1.34 (336) Further explanation should be given to help the reader understand how it is possible to propose issuing leases if it is known beforehand that violations on the law (Clean Air Act, for example) will result. (page 3-54).

The issuing of leases does not provide for the issuance of permits to mine. Exceeding the 24 hour standards does not necessarily mean the standards were violated. A violation depends on the frequency the standards are exceeded. Also, see the response to comment 1.29 in this section.

The analysis was based on a worst-case analysis, and does not consider application of available mitigation techniques.

* * *

1.35 (346) This "worst case" impact postulation is not consistent with statutory and regulatory requirements and is, therefore, unlikely ever to occur. The statement should note that air quality laws and regulations do not allow permitting a facility in violation of ambient standards. The size, timing, location, and emissions from mines would necessarily be changed to assure compliance if the standards were determined to be potentially violated.

"Worst case" was used to make analysis since actual data will not be available until the mine plan stage at development.

* * *

TOPOGRAPHY AND MINERAL RESOURCES

2.1 (26) (99) (300) ...the Statement would be improved if it addressed the anticipated impact of noise from mining and/or transportation operations on housing and other noise-sensitive types of development.

The majority of the area proposed for mining under PRLA and competitive coal leases is rural, therefore, noise (and related ground and air vibration) impacts are not expected to affect many individuals. The impacts from noise were not considered to be significant at the regional level of analysis and were, therefore, not included in the EIS. The amount and type of noise generated from mining operations and vehicles transporting workers to the mines can not be determined until mine plans are submitted by a lessee, which occurs after a lease sale and leases are issued. Environmental analysis will be prepared on the mine plans and noise related impacts to specific people, structures, resources will be analyzed at that time.

* * *

2.2 (103) (310) (311) (330) (335) (355) A full EIS is required for the PRLAs. The EA is completely insufficient, as is the attempt to place these findings in the coal leasing DEIS document. NRDC v. Berkland specifically directs that the Secretary "should have before him a comprehensive EIS which includes a careful examination of possible performance lease standards, alternative methods for meeting those standards, and estimated costs of compliance."

This EIS fully meets the Secretary's obligations to comply with NEPA prior to deciding whether to issue a PRLA. The EIS considers the environmental impacts of PRLA issuance with standard lease terms and special stipulations for each individual PRLA that are consistent with land-use planning and unsuitability criteria review results. Site specific effects on PRLAs are sufficient to allow reasoned decision making on lease terms and alternative means of proceeding, such as exchanges. The PRLA EA, which is incorporated by reference discusses individual PRLAs, Table 1-7 of the EIS summarizes additional PRLA impacts. Table 1-4 in the Final PRLA EA summarizes site specific key resources. In addition the Bureau has prepared a map for each PRLA illustrating areas of special resource concern, i.e. areas covered by unsuitability criteria or identified during the planning process. These maps are available for review at the Farmington Resource Area Office, Farmington New Mexico; Albuquerque District Office, Albuquerque, New Mexico and the New Mexico State Office, Santa Fe, New Mexico.

* * *

2.2 (cont.) The EIS discusses reasonable exchange and legislative alternatives to PRLA issuance, and identifies alternative lease terms and conditions which would provide additional levels of environmental protection. Upon completion of the EIS the Bureau will select the lease terms and standards that will ultimately be included in the lease.

The commentor is incorrect in the assertion that the EIS is to identify the cost of various possible alternative lease stipulations. The purpose of the EIS is to identify alternative lease terms to reduce environmental impacts. The Bureau will select appropriate stipulations necessary to protect the environment regardless of cost to the PRLA holder. Regulations require each PRLA holder to estimate the cost of complying with the stipulations in the final showings. The Bureau will review those cost and determine whether they have a reasonable factual basis. Only if the PRLA holder can show the presence of commercial quantities of coal, including the cost of complying with the lease terms, will a lease be issued.

The costs of compliance with lease terms will be considered as part of the final showing evaluation so the BLM "can benefit from the permittee's greater knowledge of current technology and his assessment of the cost and effectiveness of such technology prior to (BLMs) final decision on the setting of lease terms." NRDC v. Berkland, 458 F2d 925,437 (D.D.C. 1978).

* * *

2.3 (131) Uranium occurances and possible conflicts with the proposed leasing of Federal coal are not mentioned. ...Subsequent versions of the document should include a discussion of possible impacts and conflicts between coal and uranium production in the study area.

Upon completion of impact analysis for the minerals section, uranium occurences were not included in the DEIS. Uranium deposits are located primarily in the southern portion of the San Juan Basin around Gallup. Most of the uranium deposits are either located away from coal deposits or beneath coal deposits at depths of approximately 5,000 feet. The location of the uranium deposits would allow for recovery of the uranium by underground mining methods, which should not conflict with the mining of coal deposits or create impacts.

* * *

2.4 (45) (133) ...the impacts of ancillary facilities constructed on the leases are not addressed.

2.4 (cont.) Until mine plans are submitted for the tracts that are actually brought forward for lease and awarded to a successful bidder, the actual mine and the type, number and location of ancillary facilities can not be determined. It is for this reason that the statement was made on page 3-1 of the DEIS that site specific impacts of construction and mining activities on each tract will be analyzed in more detail in environmental documents prepared by the Mining and Minerals Division of the New Mexico Energy and Minerals Department and the Office of Surface Mining (OSM) when each mine plan is submitted. The information is not needed now for a reasoned choice among the alternatives.

* * *

2.5 (133) Reference should be made to the requirement to produce 1 percent of recoverable coal reserves on <u>each</u> lease issued, within 10 years (30 CFR 211.1(a)(13)). (page 1-1).

The material presented in the Introduction and Need For Leasing In The Region sections on page 1-1 do not address any specific aspects of coal leasing and development. These sections provide introductory material to this chapter and the EIS. Diligent development is discussed elsewhere in the EIS and does not need to be added to this page.

* * *

2.6 (39) (133) Diligent development is defined as 30 CFR 211.2(a)(13) as 1 percent production within 10 years of lease issuance.

The text has been revised.

* * *

2.7 (133) BLM does not have alluvial valley floor exchange procedures. Office of Surface Mining will not classify alluvial valley floors. (pages 1-12 to 1-13--SMCRA Discussion).

The Bureau's alluvial valley floor exchange procedures are outlined in 34 CFR 3436.

* * *

2.8 (133) The term "mine plan" now has <u>no</u> meaning. "Approved resource recovery and protection plan and permit application" should be substituted. (page 1-15 to 1-19).

The text has been revised in Chapter 1. "Mine plan" is substituted for "approved resource recovery and protection plan and permit application" throughout the rest of the EIS.

* * *

2.9 (133) Potential oil and gas development is not adequately discussed. Also, development of minerals other than coal is not addressed. (page 3-35).

Potential oil and gas development is not discussed since the EIS is concerned with the potential for coal development. Oil and gas is considered only from the standpoint of conflicting with coal development or coal development conflicting with oil and gas development and activities. A land use planning decision in the Chaco/San Juan MFP Coal Update requires oil and gas development take priority over coal development, if conflicts occur. Because of this decision, there are no anticipated impacts in developing oil and gas leases. Therefore, there is no need to discuss oil and gas resources in the EIS. Other minerals have been considered, analyzed, and determined to be insignificantly impacted by coal development and are, therefore, not included in the EIS.

* * *

2.10 (133) The sentence "Drilling for these commodities could conflict with coal development is incorrect. The 30 CFR 221 and 211 rules allow for simultaneous development. (page 3-35).

Simultaneous development is allowed, however, development of those commodities in the same area and time could result in problems in developing both coal and oil and gas leases. As is noted above in comment 2.8, oil and gas development would take priority over coal develoment, therefore, a conflict could occur in the development of a coal lease(s).

* * *

2.11 (133) The tract summaries use the terms "minable reserves" and "recoverable reserves." These terms have a definite regulatory meaning defined at 30 CFR 211.2(a), which is <u>not</u> consistent with their usage in the tract summary reports. "Resource" should be inserted in lieu of "reserve". We have the same comment for <u>all</u> the tract summaries.

Appendix A-1 has been revised, where applicable.

* * *

2.12 (271) No information has been presented on an alternate timetable for the mining, should the demand for coal not warrant mining on the present schedule or in the planned quantitites. Where will the coal be shipped and how will it be used if the New Mexico Generating Station is not built, of if it does not require the quantities of coal mined or planned? The impacts of midproduction cancellation of the NMGS, or of unavoidable delays in

2.12 (cont.) production should also be presented. Would there be a significant change in impact if production in contiguous tracts was consecutive (beginning production only after the previous mine has finished operations) rather than simultaneous? How would alternate plans affect the water table, air quality, for instance? Information on the impact of such changes upon the environment should be presented for evaluation.

The types of impacts identified in the EIS are projected to occur during mining operations. Any changes in market conditions resulting in a delay of coal production would result in a delay of those impacts. Consecutive tract production, slowdown, or a temporary shutdown of coal production would result in a continuation of those impacts at that level of development.

Because of a number of variables, we realize that there may not be a constant market for all of the coal that could be leased. This could be true regardless of the level of coal that might be selected for sale by the Secretary of the Interior. Because of these factors, it is assumed that market conditions at any one time would determine when, where, and if the coal would be developed. Impacts resulting from unfavorable market conditions are noted above.

Because different levels of coal development would result in the different amounts of impacts, five levels of development and impacts were analyzed in the EIS. Based on industrys interest in coal offered in the San Juan Basin and environmental considerations, the levels analyzed in the EIS were felt to reflect the most realistic levels that would be developed. Other levels could be analyzed, but the level of impacts identified would fall somewhere between the levels analyzed in the EIS. Because of this point and analysis of other alternatives would not better define the issues, the alternate levels of development proposed in this comment are not included in the EIS.

* * *

2.13 (294) ...the final (EIS) should estimate the badland topography that would be disturbed by these energy projects in relationship to total badlands in the area.

Due to the lack of inventory information on topographical features in the region, this information is not available. Additionally, clarification is needed as to what is specifically meant by "badland topography," since there are several soil and topographical associations that could be considered as badland topography. The three WSAs contain all of the badlands on BLM lands with wilderness potential.

* * *

2.14 (300) Exploration, recovery, and/or conservation of resources such as natural gas, oil, alumina, titanium, sand and gravel, limestone, etc. have not been discussed. There is no plan what is to be done if these resources are encountered during mining activities.

See the response to comments 2.3, 2.9, and 2.10 in this section. Procedures for handling other mineral resources encountered during mining operations would be specified in a mine plan developed for each lease.

* * *

2.15 (309) "In-place reserves for leased Federal coal are approximately 2.2 billion tons with 1.75 billion tons [of leased Federal coal] being recoverable." (p. 1-4). This contradicts p. viii, which shows 2.2 billion tons just for PRLAs. Also, 1.75 billion is undocumented,...If it refers to PRLAs only, they are not yet leased. If it excludes PRLAs, it contradicts the figures of p. 1-24. It omits non-Federal coal, which also contributes to production in the No Action Alternative.

The text has been revised.

* * *

2.16 (309) (309) (309) PRLA production will be "1.6 million tons...in 1987 and 20.5 million tons...in the year 2000." (p. 1-4). This statement contradicts the Final Environmental Assessment for the PRLAs and the PRLA holders themselves, both of which give over 36 million tons/year for PRLA production. PRLA "surface mining would disturb...10,000 acres in the year 2000." (p. 1-4). This contradicts the PRLA Final Environmental Assessment, which says 22,000 acres. All PRLAs are shown in Table 1-1 to have a 35 year life. (p. 1-5). This contradicts the Final Environmental Assessment for PRLAs.

Coal production and surface mining disturbance projections were not developed for start up and peak production (or annual average production) in the PRLA EA. Instead total figures of 1.15 billion tons and 22,000 acres were projected for coal development and surface disturbances for the PRLA tracts.

Production figures were developed for 1987 (start up) and the year 2000 (peak production) for the PRLAs. These figures were recalculated using additional data provided by BLM geologist, mining engineers (Mineral Management Service), and preferance right lease applicants. This data resulted in calculating tonnage figures for 7 mining units (page 1-5 DEIS) instead of the 26 PRLAs with 35 years projected for the life of the mines. Changes in tonnages and mine life were incorporated into the

2.16 (cont.) EIS, and are a more accurate presentation than the data presented in the PRLA EA.

* * *

2.17 (309) Table 1-4 shows disturbance of 705 acres for surface facilities under the No Action Alternative. (p. 1-9). This figure contradicts p. 1-4, which says 705 acres will be disturbed at the PRLAs only. Thus Table 1-4 omits disturbance at all other existing leases, both Federal and non-Federal, which would be developed under the No Action Alternative. It also contradicts p. 1-24, which shows over 9000 surface acres disturbed at non-PRLA projects in the No Action Alternative.

The text has been revised.

* * *

2.18 (309) Table 1-4 shows lower impacts for the Bypass Alternative than for the No Action Alternative. (p. 1-9). This is impossible, since the Bypass Alternative includes the No Action Alternative. Also under the Bypass Alternative numerous existing leases and PRLAs will be developed, but their impacts do not appear to be counted anywhere.

Table 1-4 presents the impacts for each alternative and was not intended to show cumulative impacts by alternative. Cumulative impacts are derived by adding the No Action impact numbers to each alternative.

* * *

2.19 (309) Federal...reserves that would be leased are approximately 1.32 billion tons [in the Target Case], with approximately .7 billion tons being recoverable." (p. 1-10). This contradicts p. 3-3, which shows recovery rates of 50% for underground and 85% for surface mines.

The recovery rates (50% and 85%) were derived from projections made by industry representatives and BLM mining engineers. These rates are based upon the most favorable conditions that could exist for mining. It is recognized that many variables such as seam thickness, coal bed dips, overburden and technological constraints can adversely or beneficially affect the assumed recovery rates. These percentages were utilized to project the amount of coal to be mined for each tract and not to draw a direct correlation between the projected resources and recovery rates in developing final recoverable reserves.

* * *

2.20 (309) "...coal production [in the Target Alternative] would be... 0.025 billion tons [25 million tons] in the year 2000 (peak production)...." (p. 1-10). This is false. Peak production exceeds 30 million tons/year in the Target Alternative. It is above 25 millions tons for 30 consecutive years, and the highest single year is 2013.

It is recognized that variables would have an affect on whether peak production would occur prior to or after the year 2000. The year 2000 was designated as 50 percent (approximately) of the proposed lease tracts would be in production or pre-production stages which would result in the most significant impacts. The actual peak production may occur after the year 2000, but it is felt that a general tapering off of production and impacts will start to occur after 2000.

* * *

2.21 (309) "...average annual coal production would be approximately .13 billion tons from 1985 through the year 2007..." (p. 1-10). This implies 1985-2007 production of 2.99 billion tons, and is clearly false.

The text has been revised.

* * *

2.22 (309) In the High Alternative, "production would be approximately .009 billion tons in 1987 (start-up)...and .062 billion tons in the year 2000 (peak production)...(refer to Figure 1-1)." (p. 1-11). The data underlying Figure 1-1 contradict this sentence. Production begins in 1985, not 1987, and peaks in 2004, not 2000. It is .008 billion tons in 1987, not .009, and it is .044 billion tons in 2000, not .062.

A number of variables determine the start-up date of any lease. Because of a variety of factors projected in industry's expression of interest , different start up dates were considered for the 39 competitive coal lease tracts. This point is noted in the assumption listed in Chapter 3 that "On the average, start-up of construction and production on the competitive lease tracts will occur in 1986 and 1987 respectively." Applying a 1987 date for all these tracts is incorrect. See the response to 2.1_ above concerning peak production.

* * *

2.23 (309) In the High Alternative "average annual coal production would be approximately .24 billion tons from 1985 through the year

2.23 (cont.) 2007..." (p. 1-11). This statement implies 1985-2007 production of 5.52 billion tons and is clearly false.

The text has been revised.

* * *

2.24 (309) Footnote "a" shows all tracts beginning mining in 1987. This contradicts the assumptions of tract-specific start dates which underlie Figure 1-1. (p. 1-17).

The text has been revised.

* * *

2.25 (309) "Other projects that are part of the No Action Alternative" are defined to be "existing and proposed mines under contract commitments or mine plans..." (p. 1-23). This definition contradicts Figure 1-1, since that figure does not reflect operation of all, or even most, "existing and proposed mines."

Figure 1-1 was developed to display a projected level of coal produced in 1987, 1990, 1995, and the year 2000 for other coal sources, PRLAs, and competitive coal lease tracts. Because the number of mines and actual coal production varies at any one time, no attempt was made to show which mines, PRLAs, or tracts would be in production for the four years shown in this figure. The only thing that can be determined from this figure is the total amount of coal projected to be developed in any one of the four years from one of the three sources of coal development. Any other assumptions or interpretations of Figure 1-1 by the reader are considered to be incorrect. The statement quoted from page 1-23 does not contradict the level of production displayed in this figure and will remain as written.

* * *

2.26 (309) "For the other [non-PRLA] projects, impacts between the years 1987 and 2000 are assumed to remain the same." (p. 1-23). This contradicts Figure 1-1, which shows coal production from "other projects" declining steadily from 1987 to 2000.

Figure 1-1, does not show coal production from "other projects" as declining steadily from 1987 to 2000. Production is shown to increase from 1987 through 1995. A gradual decline in production begins in 1995. Additionally, the statement quoted from page 1-23 is talking about impacts while Figure 1-1 presents information on coal production. While a correlation between coal production and impacts can be made, a gradual decline in production from 1995 to the year 2000 is not projected

2.26 (cont.) to create significant changes in the level and type of impacts occuring prior to 1995. The text will remain as written.

* * *

2.27 (309) Total PRLA coal recovery is shown as 1.15 billion tons. (p. 1-24). This contradicts the Final Environmental Assessment for the PRLAs, which shows recovery of 1.404 billion tons. It contradicts the implied recovery per pp. viii (2.2 billion tons of total PRLA coal), 1-5 (5 out of 7 tracts surface mined), and 3-3 (85% recovery of surface mined coal).

The 1.404 billion ton figure is listed in Table 1-2 of the PRLA EA, which is a listing of assumptions, as is noted on pages 1-6 and 155 of the draft and final EA, respectively. Impact analysis for the Geology section of the draft EA presents 1.15 billion tons (approximately) as being mined and unavailable for future production. Additionally, the statement on page viii states new leases would be issued for 2.2 billion tons of federal coal. It does not imply that 2.2 billion tons of federal coal would be recovered. See the response to comment 1.21 in this section on recovery rates. The text will remain as written.

* * *

2.28 (309) "...the village of Bisti...." (p. 2-7). No such village exists.

The text has been revised.

* * *

2.29 (309) Operating coal mines are listed. (p. 2-7). The Gateway Mine bordering the Bisti WSA is omitted. The Mentmore Mine near Gallup is omitted.

The text has been revised.

* * *

2.30 (309) The Sundance tract is shown with Federal reserves of 4 million tons, non-Federal reserves of 1.5 million tons, and total reserves of 5.0 million tons. (p. 2-9). This is an apparent arithmetic error.

The text has been revised.

* * *

2.31 (309) Recoverability of non-federal coal at the Samson Lake #2/2 tract is shown as less than 2% of reserves. (p. 2-9). This is an apparent arithmetic error.

The text has been revised.

* * *

2.32 (309) Map 2-2 shows "Bisti WSA and Associated Coal Tracts." (p. 2-32). This map omits the coal tracts associated with Bisti WSA in the No Action alternative--4 existing Federal leases, 9 existing PRLAs and at least one operating mine on a state lease are also in the area mapped in Map 2-2.

Map 2-2 was designed to illustrate the new proposed competitive coal lease tracts located around the Bisti WSA and not the existing state and federal leases and PRLAs. All of the leases (existing and proposed) are presented on Visual C.

* * *

2.33 (68) (309) (328) "Production would begin within 10 years of the issuance of a lease..." (p. 3-2). This assumption is contradicted by the data underlying Figure 1-1, which show 10 tracts beginning production in 1994 or later.

Hospah #1, Gallo Wash #2 and Hospah #2 were originally projected to start mining in 2010, 2015, and 2020, respectively. These and other tracts are now projected to be leased and developed as parts of logical mining units with adjacent tracts. Development of Hospah (#1 and #2), Gallo Wash #2, and other tracts with adjacent operations would occur prior to 1993.

* * *

2.34 (309) Table 3-2 shows zero acres of surface facilities for non-PRLA developments in the No Action Alternative. (p. 3-6). What about the Star Lake railroad and Fruitland Coal Load transmission line?

The text has been revised.

* * *

2.35 (309) Tables 3-6 and 3-7 lists impacts under the No Action Alternative only for Federal coal... (p. 3-16). This contradicts Figure 1-1, where production under the No Action Alternative purports to include existing mines and non-Federal mines.

Figure 1-1 does show coal production for non-Federal coal mines. The fact that these tables did not compute the acres of

2.35 (cont.) rights-of-way that would be disturbed by coal development on non-Federal land is tied to land ownership. Tables 3-6 and 3-7 are concerned with calculating rights-of-way on Federal land, for which BLM has available data, is required to issue permits and to ensure the rights of the permit holders. All other rights-of-way located on non-Federal land would be negotiated with the appropriate land owners.

* * *

2.36 (309) For each tract recoverable Federal coal and expected Federal royalties are given. From these an implicit price per ton can be calculated. These prices vary considerably. The actual analysis used $20/ton for all surface mined coal. The apparent variance is because the tonnages on pp. A-1 to A-45 do not correspond to the tonnages used in calculating royalties. The tonnages actually used by the BLM are the same as those which underlie Figure 1-1. Pages A-1 to A-45 should be corrected.

The tonnages presented on pages A-1 to A-45 and the projected amounts of coal projected for each of the four years presented in Figure 1-1 are the same tonnages. These tonnages were used to calculate royalties. The text will remain as written.

* * *

2.37 (309) Bisti #6/8 Tract has recoverable reserves of 1 million tons but will produce 5 million tons/year. (p. A-11). This is impossible.

The text has been revised.

* * *

2.38 (309) Lee Ranch West tract has recoverable reserves of 202 million tons, a projected life of 25 years, and production of 3 million tons/year. (p. A-16). These figures are self-contradicting.

A closer review of the DEIS reveals statements made in the Lee Ranch West tract summary that the tract contains 101.0 million tons of mineable Federal resources. The tract total is 238.0 million tons of mineable resources. The recoverable reserves for Federal coal is 86.0 million tons. The tract total is 202.0 million tons. The expected production rate for the 86.0 million tons of Federal reserves is 3.0 million tons per year for 25 years. Therefore, the resulting difference between the 202 and 86 million tons can be attributed to the fact that Federal coal accounts for only a portion of the total coal that located within the Lee Ranch West tract boundaries.

* * *

2.39 (309) Bisti #1 tract production would be 127 million tons. (p. A-26). This ignores the reduction resulting from the Bisti Land Exchange.

At this time, the Bisti Coal Lease Exchange with Sunbelt Mining Company has not been finalized. Until this exchange is completed, adjustments to the amount of Federal coal that would be offered for competitive coal lease can not be made. Adjustments to the amount of coal offered for sale in this tract, or any other tract, can be made up until the tracts are offered for bids.

* * *

2.40 (309) Samson Lake #2 tract will produce 1.6 million tons/year for 29 years, yet total production will be only 9.37 million tons. (p. A-30). These figures are self-contradicting.

The text has been revised.

* * *

2.41 (309) Gamerco #1 tract total reserves are less than recoverable reserves. (p. A-43).

The text has been revised.

* * *

2.42 (309) (336) Initial expressions of interest were "2.3 billion tons." "900 million tons" were withdrawn. "1.9 billion tons" were left. (p. A-47). These figures are self-contradicting.

The text has been revised.

* * *

2.43 (309) The Catalpa Canyon and Gamerco #1 (HC) tract(s) is included because it has, among other factors, a "high quantity of coal." (p. A-56 and A-57). Catalpa Canyon has 0.4 million tons of Federal coal, the least of any of the 39 tracts included in the DEIS (p. 2-10). Gamerco #1 (HC) has 3.0 million tons of Federal coal, the sixth, lowest of the 39 tracts in the DEIS (pp. A-1 to A-45).

A number of factors were considered along with the amount of Federal coal projected for each tract. The factors that were considered in ranking the tracts are listed in Table A-3-1.

* * *

2.44 (310) (311) (335) Prior to publication of the EIS, BLM needs to: (1) examine prior claims on PRLA land; (2) research the validity of the original prospecting permits, many, if not all of which are of questionable legality; (3) produce the promised PRLA leasing manual, (4) properly designate areas unsuitable; and (5) properly evaluate mitigation and reclamation costs.

(1) Prior Claims - The Bureau's position on prior claims is explained in the preamble to the December 16, 1981 proposed rules which lead to the July 30, 1982 revision to 43 CFR 3430. 2-2 (1980), 46 Federal Register 61398 (1981). The preamble explains that only prior claims of record were a bar to issuance of a prospecting permit. Since the policy of the BLM is to "rely on the assumption that individuals claiming pre-existing adverse rights will assert those rights as they see fit," 46 Federal Register 61399, no examination is needed for prior claims.

(2) Validity of Prospecting Permits - As expressed in the preamble to the July 19, 1979 regulations, 44 Federal Register 42599 (1979), the Bureau has decided to give a presumption of administrative regularity to the issuance of a prospecting permit if the file contains a finding from the Geological Survey that the "existence of workability" of the coal in the areas covered by the permit were not known when the prospecting permit was issued. Appropriate findings can be found in all San Juan PRLA files and the commentor has failed to submit any factual information which would provide any basis to look behind this presumption of administrative regulatory.

(3) PRLA Manual - The preamble to the July 30, 1982 regulations indicated that manual provisions would be prepared containing information on environmental procedures and format. These were not made a prerequisite to further PRLA processing. Existing direction, 43 CFR 3430, CEQ regulations and existing Bureau and Departmental manuals provide more than adequate direction for processing PRLAs.

(4) Unsuitability - Each PRLA has been fully and completely reviewed in accordance with the requirements of 43 CFR 3460 and proper stipulations have been added to the proposed lease form of each PRLA. The commentor has failed to identify any specific shortcomings in the PRLA unsuitability review and a more specific response is not possible.

(5) Properly Evaluate Mitigation and Reclamation Cost - The Bureau intends to review mitigation and reclamation cost as required by 43 CFR 3430 when it reviews the final showings of each PRLA holder. As the regulations require, each PRLA holder must show the costs of complying with lease terms as part of

2.44 (cont.) its final showing. There is no need for such cost information to be included in the EIS.

* * *

2.45 (321) (328) We question whether annual coal production would average .24 billion tons in the EIS region. ("High Level Alternative", 2nd paragraph, 2nd sentence, p. 1-11).

The text has been revised.

* * *

2.46 (321) The brief discussion of the McKinley County coal exchange should show that Santa Fe Pacific Railroad Company, not Santa Fe Mining Company, has proposed this exchange. The summary should explain that as a result of the exchange, the federal government will have several blocks of federal coal available for leasing, including tracts for small business set-aside leasing. (Interrelationships with Other Projects in the Region, p. 1-22).

The text has been revised.

* * *

2.47 (321) The Ambrosia Lake Uranium District is 8 miles southwest of the Lee Ranch tracts. Any subsidence associated with underground uranium mining would have no surface effect beyond a few score feet from the center of any subsidence feature. It is misleading to imply subsidence could affect coal mining operations at Lee Ranch. (Geologic Hazards, p. 2-3).

The statement made on page 2-3 merely states that ground subsidence has occurred as a result of underground mining in the Ambrosia Lake Uranium District and that this area is located approximately 5 to 6 miles south of the Lee Ranch tracts. It does not imply that subsidence from coal mining operations would occur at the Lee Ranch tracts. The text will remain as written.

* * *

2.48 (328) On page 2-7, under the heading Operating Coal Mines, first paragraph, the statement is made that nearly all the mines in the Crevasse Canyon and Menefee Formations are now abandoned. That statement is not true, there are several mines still operating in the Menefee Formation. In the second paragraph, the AMCOAL Mine is discussed. The production listed for 1981 for AMCOAL was actually the production in 1980. The mine has been closed since 1980 and final reclamation is underway at the mine site.

2.48 (cont.) The production figure listed in the third paragraph for the McKinley mine is for 1980, and not 1981, as are the production figures listed in the fourth paragraph for the Navajo and San Juan mines, as well as the De-Na-Zin mine. The De-Na-Zin mine produced 211,145 tons in 1981. In addition, there are three other mines in the San Juan Basin which were not mentioned--one is the Mentmore mine, operated by Carbon Coal Company near Gallup--one is the Burnham Mine operated by Consolidated Coal Company near Burnham on the Navajo Reservation, and the third is the Arroyo No. 1 mine, located near San Luis.

The text has been revised.

* * *

2.49 (328) The discussion of subsidence should be expanded to recognize other possible effects beyond structural damage. The hazards include health and safety, both to people and livestock, as well as fire and disruption of both ground and surface water features. (p. 3-7, Underground Mining).

See the response to comment 2.1 of this section. Specific impacts associated with subsidence will be identified and analyzed in the environmental analysis to be conducted on mine plans submitted by lessees.

* * *

2.50 (328) (345) Neither the Draft Leasing EIS or the Regional Coal Team have addressed the needs for administrative resources to collect coal royalties or to enforce requirements for diligent development of lease tracts. The Interior Department has discretionary authority regarding a number of the factors that will determine the revenues New Mexico will receive through the federal coal leasing program. These discretionary areas include:

1. how lease sale schedules are set;
2. how royalty levels are set and enforced;
3. what preconditions are imposed upon leases respecting their obligations to work with local governments; and
4. how requirements for the timely development of lease tracts will be established and enforced.

Neither the substantive or procedural elements of these subjects is addressed in the Draft leasing EIS.

These are administrative and/or legal questions, outside the scope of this EIS. Information on lease sales, royalty levels,

2.50 (cont.) coordination with local governments, and diligent development of tracts is provided in 43 CFR 3400 and will be provided by local BLM officials on request.

* * *

BLM decided to allow Arch Minerals to include Ah-Shi-Sle-Pah Wilderness Study Area in its final showing of commercial quantities. BLM states that "no leases will be issued until after a final decision is reached on the status of this WSA" (p. 1.14). However, a showing of commercial quantitites may give Arch Minerals a valid existing right which may impair the possibility of wilderness preservation. ...What will happen if Congress makes no ruling on Ah-Shi-Sle-Pah by December 1984, the regulatory deadline for the processing of PRLA's?

2.51 (330) (335)

No coal leases will be issued until Congress has acted upon wilderness designation despite the regulatory deadline. The valid existing right is to adjudicate the application for lease.

* * *

PALEONTOLOGY

3.1 (89) Mitigation measures are briefly outlined on Page 3-50 of this EIS and the statement is made that these measures "would be applied to impacts identified under the alternatives." This is somewhat of a nebulous statement, but I take it to mean that the types of paleontological mitigation procedures indicated on Page 3-50 will be required for each tract of PRLA and competitive lease land that is leased for coal mining and think that a statement to that effect should be added to the EIS.

The text has been revised.

* * *

3.2 (133) The basis for "1400 fossil localities would be disturbed" is unclear. (page 3-41--Paleontology).

Specifically, the basis for the number of fossil localities in a given tract is a count of known and recorded occurrences taken from the inventory data base. In cases where there are no known localities in a potentially fossiliferous area the number is estimated by using a formula of 13.5 localities per square mile.

* * *

3.3 (142) (310) Under the Paleontology section, it is suggested that "Private or institutional support for an ongoing paleontological research program in the general EIS region might also affect losses otherwise incurred." (3-50). How does BLM intend to find such support? What role does the agency expect to play? And what if they are unable to secure outside funding? How will that affect mitigation strategies for paleontological resources?

Aside from the stipulations laid down in the standard coal lease (Sec 31 b), there are several sources of support for salvage of fossil materials. New Mexico state government has actively supported and volunteered paleontological expertise in research and mitigation through its Bureau of Mines and Mineral Resources in Socorro and the newly funded museum of natural history. In addition, there is ongoing and productive research in paleontological resources being conducted by the University of New Mexico through the Geology and Anthropology departments. Also, every year there is continuing field work and research being conducted by paleobiologists, paleobotanists, and paleontologists from other museums and universities across the county such as Carnegie Museum, Yale Peabody Museum, Yale University, New York University, University of Arizona, University of Minnesota, etc.

3.3 cont. The BLM will keep advised about the gains in paleontological resource information. The new knowledge will affect how the lease term is to be applied, if new information indicates new courses or methods of study.

The BLMs role is to fulfill its mandated responsibility to manage and protect the fossil resources. Some of the ways this is accomplished is by participating in professional level studies and research; collaboration and consultation with non-BLM, state, and national institutions; developing an awareness for the paleontological resources in the public and scientific communities through personal contacts, exhibits when applicable, and published information on fossils in the Resource Area. Coordination is shared with USGS and other agencies, national and foreign institutions, and groups for exchange of paleontological information.

* * *

3.4 (160) ...and 2,500 paleontological sites will be destroyed. How will these be studied or otherwise saved for future study?

Site specific mitigation procedures for each locality would be too extensive and inappropriate for the DEIS, however, general guidelines and procedures are provided in the Paleontology section of the Mitigating Measures subsection of Chapter 3 in the FEIS.

* * *

3.5 (321) This section should be amended to reflect that a detailed paleontological inventory of the private and state lands within the Lee Ranch Mine permit area was conducted in 1980 (LeMone, Harris, et al). It revealed no significant fossil material. This report is on file at the BLM's Albuquerque District Office. (Southern Area, p. 2-11).

The text has been revised, however, published literature and subsequent surveys indicate that this inventory is probably incomplete, since paleontological resources have been found in that area.

* * *

3.6 (321) The discussion of paleontological resource impact refers to a site within Section 35, Township 15 North, Range 8 West. This parcel of land is not within the Lee Ranch Middle tract, but within Lee Ranch West. Moreover, this site is on private land and minerals and was not located during the 1980 paleontological inventory conducted by LeMone, Harris, et al. (Lee Ranch Middle Tract, p. A-15).

PALEONTOLOGY

3.6 (cont.) The text has been revised. The fact that a site was not located by LeMone, Harris, et al only reflects the degree of thoroughness of this inventory. More thorough inventories were completed in 1981 (Flessa, 1981) which located several potentially significant occurrences throughout the study area (see O'Sullivan et al 1972; Mannhard, 1976; and Kues et al, 1977).

* * *

3.7 (328) This section should be expanded to recognize the Paleontological Mitigation Program. (page 3-7).

The State of New Mexico's voluntary Paleontological Mitigation Program generally shares the same goals as the Bureau, however, it is not compatible with present BLM policy and as such has not been adopted by the Bureau.

* * *

3.8 (328) Compare Figure 2-3 of the BLM document to Appendix I of this report. Figure 2-3 of the BLM document is simply not accurate or adequate. The lowermost unit, the Chinle Formation, is Triassic in age, not Jurassic and is followed by other rock units seen in our Appendix I but not shown in Figure 2-3 of the BLM document. A major unconformity clearly separates the Chinle Triassic rocks from the overlying Jurassic units. This unconformity, representing many millions of years, is not even shown in the BLM Figure 2-3. Note also the...disregard for actual thicknesses of rock units in the BLM document as compared to Appendix I.

The commentor has misinterpreted the purpose of Figure 2-3. Figure 2-3 is not a "general" or "generalized", "stratigraphic" or "complete" section of the EIS region it is in fact a general composite of the stratigraphy of the EIS region.

An explanation was given for the division of the EIS region into two areas, "Northern" and "Southern" (page 2-11 of the DEIS). It was to allow the general public greater convenience in understanding coal tract leasing and ranking.

The composite (Figure 2-3) is accurate and acceptable except for two obvious errors, which have been corrected. It should be noted that the age assignment and the uncomformity separating the Chinle Triassic rocks from the overlying Jurassic units has been questioned in the literature (Olsen and Galton, 1977). It is agreed by other scientists that the uncomformity is questionable and that the Chinle Formation could be Lower Jurassic, thus casting some doubt on the reality of Triassic-Jurassic Tetrapod extinctions.

3.8 (cont.) Thank you for the information; however, we believe the stratigraphic information, as presented, is adequate for the purposes of this EIS.

* * *

3.9 (328) The age of the Ojo Alamo is disputed and may be Cretaceous. The Galisteo and Zia Sand have nothing to do with most of the units included in the chart;...(figure 2-3)

The text has been revised.

Although vertebrate (including mammalian) fossils are reported from the Ojo Alamo Sandstone (Baltz, Ash and Anderson, 1966; Fassett and Hinds, 1971; Riby and Lucas, 1977), there remains still a serious debate about the provenience of the fossil material and its documentation. The Ojo Alamo is generally considered by most workers to be Paleocene in age and was, therefore, utilized in the EIS.

* * *

3.10 (328) The text shows the Mancos to be 2,300 feet thick but Figure 2-3 shows the Mancos to be less than half this thickness. The figure is also misleading in terms of relative importance of coal resources.

If the upper and lower units are combined, the Mancos is 2300 feet thick in the northernmost part of the Basin outside the study area, and about 1950 feet thick in other parts of the basin. For the most part, the unit averages about 1500 feet throughout the basin (Molinaar, C.M., 1977), which is fairly accurately reflected in Figure 2-3. In addition, this figure was not intended to show the relative importance of coal resources since this section deals with the paleontological resources.

* * *

3.11 (356) BLM states that five paleontological sites on PRLA's under long-term study would be destroyed by mining. In reality, the scientific values of these sites may well be extracted prior to mining depending on when the sites are mined. With adequate notice, most paleontological sites can be quickly and efficiently mitigated prior to mining. The paleontology discussion in general throughout the DEIS is deficient as the significance of sites that may potentially be disturbed is not stated and is presumably unknown. (page 3-8).

The commentor has incorrectly interpreted the DEIS, the correct statement made in the BLM document is that fossil collecting sites on five PRLAs...would be destroyed--not five paleontolo-

3.11 (cont.) gical sites on PRLAs would be destroyed by mining. The assumption that sites may well be extracted prior to mining is in error. The significant sites will be extracted prior to mining. The assumption that most sites can be quickly and efficiently mitigated prior to mining is also in error. Paleontological sites can be mitigated quickly but not efficiently prior to mining. The state of the art in excavation and salvage of paleontological material has not progressed to the level of efficiency needed to gain the optimum data for thorough scientific study.

Determining significance of paleontological material generally cannot be accomplished on the spot in the field and in many cases cannot be determined until sufficient material has been collected from the site and its contextual relationship studied and analyzed. In some cases, the significance of fossil material may not become known or realized until several years after its collection. It is true that the significance of some sites which may potentially be disturbed is not known presently and indeed will not become known until data recovery is accomplished. Therefore, we believe that fossil occurrences or potential sites are correctly and adequately discussed in this EIS.

* * *

3.12 (356) Paleontology impacts are given in terms of number of localities disturbed, with no discussion of the significance, or lack thereof, of the resources in question. This is an important point in that, as reported in the literature, the vast majority of fossil localities in the area are of common, scientifically inconsequential fossil wood and wood scatters. This applies to paleontology discussions throughout the DEIS. (page 3-27).

Discussion of paleontological significance is discussed on pages 2-11, 2-15, 3-8 and 3-54. References are provided for comprehensive analysis and descriptions of the fossil resources and paleoenvironment. We believe that the text as written accurately reflects the significance of this resource. Sources listed in the reference section of the EIS provide additional information about the problems, controversies, and importance of the paleontological resources in the San Juan Basin.

* * *

4.1 (12) (45) (68) (69) (103) (200) (333) (335)

...there is no analysis of reclamation cost or feasibility in the coal leasing EIS. ...include a detailed cost/time-frame and feasibility study for each area.

The soils and reclamation information presented in the DEIS addresses only the general mining impacts as they relate to soils and their characteristics on a regional basis.

The text has been revised. Specific reclamation cost and feasibility, irrigation and other special conditions, consequences of reclamation not occurring, construction of erosion and sediment retention structures, and reclamation as provided by law must be provided in mine plans that are submitted by the lessee to the Office of Surface Mining and the State of New Mexico's Energy and Minerals Department. The specific information that is requested of the lessee is provided in the Surface Mining Control and Reclamation Act (SMCRA) of 1977, and State of New Mexico Rule 80-1.

Specific sections of the Surface Mining Control and Reclamation Act of 1977, which apply to the points listed in paragraph two above are:

(I.) Section 507 - Application Requirements
Section 508 - Reclamation Plan Requirements
Section 509 - Performance Bonds
Section 515 - Environmental Protection
Section 518 - Penalties
Section 519 - Release of Performance Bonds or Deposits
Section 520 - Citizens Suits

Specific sections of the State of New Mexico Coal Regulations-Rule 80-1, which apply to the points listed above are:

(II.) Part 08 - Permit Application
Part 09 - Permit Application
Part 14 - General Requirements for Bonding of Surface Coal Mining and Reclamation Operations
Part 15 - Amount and Duration of Performance Bonds
Part 17 - Procedures, Criteria, and Schedule for Release of Performance Bonds.
Part 20 - Performance Standards - Surface Coal Mining Operations.
Part 20 - 111 -- Revegetation - General Requirements.

(II.) Part 20 - 115 -- Revegetation - Grazing
Part 20 - 116 -- Revegetation - Standards for Success
Part 20 - 133 -- Post Mining Land Uses

Without detailed information from mine plans, a detailed cost and time frame study for each area is not feasible.

* * *

4.2 (69) ...The EIS does not discuss the differences in soils and rainfall between the Navajo and San Juan Mines and the PRLA area.

The major soil associations within the Navajo and San Juan Mines are the soils numbered 3, 4, and 6 in Table 2-6 of page 2-16 of the DEIS.

The information presented below shows the annual precipitation during the fiscal year 1979-80.

Farmington Experiment Station	7.86 Inches
Fruitland	7.15 "
Otis	6.74 "
Star Lake	9.53 "
Waterflow	6.91 "
Chaco Culture National Historical Park	11.00 "
Gallup	9.25 "
Thoreau	11.08 "

Information on precipitation is provided in paragraph 2 of the Climate section in Chapter 2 of the DEIS.

* * *

4.3 (69) ...The proposed lease conditions do not guarantee that irrigation will be required or make any other special conditions on reclaimability. (p. A-66).

See the response to comment 4.1 of this section.

* * *

4.4 (335) (362) ...the Coal Leasing DEIS should contain much more information regarding the specific seed mixture to be used in replanting,

4.4 (cont.) water consumption needed to revegetate the stripland, and the rates at which native vegetation not included in the seed mixture will recolonize the land.

Requirements by law do not call for specific seed mixtures to be used in replanting, but do specify a permanent vegetative cover of the same seasonal variety native to the area (SMCRA, 1977 (section 515)).

Federal agencies have developed seed mixtures for large general areas, while mining companies have developed mixtures for site specific mines.

Seed mixtures consist largely of native species found within the lease or mine area along with some introduced species. Examples of seed mixtures developed by both the BLM and a mining company are listed below.

BLM Seed Mixture Number Two

Crested wheatgrass	3 1/2 lbs/acre-Intro.
Fourwing saltbush	1 lb./acre-Native
Sand dropseed	3/4 lb./acre-Native
Alkali sacaton	3/4 lb./acre-Native

McKinley Mine Seed Mixture

Western wheatgrass	4.30 lbs/acre-Native
Tall wheatgrass	4.13 lbs/acre-Intro.
Intermediate wheatgrass	2.44 lbs/acre-Intro.
Sideoat grama grass	2.42 lbs/acre-Native
Galleta grass	1.74 lbs/acre-Native
Fourwing saltbush	1.16 lbs/acre-Native
Winterfat	0.60 lbs/acre-Native
Indian ricegrass	0.35 lbs/acre-Native

The water consumption needs for revegetation will be affected by the site specific soils, their vegetative cover, and the amount of precipitation received during the growing season (May thru September). Five to six inches of precipitation received during this period would be considered adequate for plant growth. The San Juan Mine has developed an irrigation schedule to supplement plant development during the growing season.

Precipitation received during the growing season and the competitive ability of the species seeded will be the critical factors affecting the rate that native species recolonize the land. A period of five to ten years is needed for recoloniza-

4.4 cont. tion allowing for natural succession, perennial plant establishment, and adequate precipitation.

* * *

4.5 (99) There are no data on how much moisture is absorbed into the soil between the washes and its evaporation rate.

Data is presently not available for any particular area or soil type. Evaporation rate studies are being conducted at the present time at the San Juan Experiment Station. This information is not needed for a reasoned choice among the alternatives.

* * *

4.6 (99) I can find no data for comparison purposes on the success or failure of reclamation efforts at the McKinley Mine site near Window Rock. What is growing there? Is the land being used now and is it producing income for its users?

Annual precipitation has been supplemented with irrigation to establish initial revegetation. The response to comment 4.4 of this section lists the seed mixture used at the McKinley Mine. The rehabited areas at the mine are not officially open to livestock grazing. However, stray sheep and goats have been found on the rehabited areas.

* * *

4.7 (103) ...Possible consequences of reclamation not occurring as projected are not addressed...

The text has been revised. See the response to comment 4.1 of this section.

* * *

4.8 (133) The discussion in the subsection concerning "Soils" makes no mention of any anticipated or necessary construction of erosion control or sediment retention structures. These structures likely will be necessary and should be discussed.

These are required by existing regulatory requirements. See the response to comment 4.1 of this section.

* * *

4.9 (156) Can we be assured of reclamation as provided in the law?

4.9 (cont.) The BLM, OSM, and the State of New Mexico are comitted to effective enforcement of reclamation requirements. See the response to comment 4.1 of this section.

* * *

4.10 (99) (325) Even without grazing, how can revegetation be claimed successful until irrigation is withdrawn? Can the new growth sustain itself in a dry spell?

Success can be claimed for initial establishment of vegetation. Irrigation has been used to supplement precipitation received during the growing season for a two year period.

The ability of a new plant(s) or growth to sustain itself in a dry spell depends on the factors listed below.

(1) Length of the dry spell.
(2) Age of the new plants or growth (i.e. have the plant components fully developed and able to reproduce).
(3) Survival characteristics of the new plants or growth.

Lessees are required to reseed, if initial planting efforts are unsuccessful, during a ten year period following the last seeding or irrigation.

* * *

4.11 (289) Throughout the DEIS, it is assumed that all the land can be reclaimed, yet there is no basis for this assumption. The EIS should offer a more realistic estimate of the percentage of each tract that is reclaimable.

The text has been revised to include an assumption on land reclamation. See the response to comment 4.1 in this section.

* * *

4.12 (300) Specific land management plans for restoring the soil productivity after reclamation, treatment of toxic material, saving the top soil and irrigation needs have not been discussed...In case of underground mining specifics of surface subsidence control and guidelines have not been developed.

These are included in existing regulatory requirements. See the response to comment 4.1 in this section.

* * *

SOILS/RECLAMATION POTENTIAL

4.13 (311) Because revegetation as legally defined has not yet been shown successful at other mines in the area, the Regional Coal EIS must assess the probability of revegetation success on the PRLA areas...Nor does it present sufficient information about the components of reclamation so that the reader could arrive at his/her own independent conclusions regarding reclaimability... The components of reclamation about which information is insufficient or totally lacking are described below.

> The EIS contains no specific soil distribution and soil chemistry information. Approximations of the acreage figures for each soil association listed on Table 2-6 are totally lacking. Sodium Absorption Ratios are not given for the soil associations.

The text has been revised to include additional information on reclamation potential. See the response to comment 4.1 in this section.

* * *

4.14 (311) (357) No analysis is included in the EIS of the potential for developing toxic layers in the plant-root zone. Also, there is no analysis of the potential effects of toxic mine wastes and spoils on ground and surface waters.

This is included in existing regulatory requirements. See the response to comment 4.1 in this section.

* * *

4.15 (311) EIS has identified a number of significant impacts for which no mitigation measures are recommended at all. These include reclamation of surface mined lands,...In light of the questions raised...about the reclaimability of lands in the San Juan region, the EIS must identify those regions where reclamation is likely to be unsuccessful so that stipulations against surface mining may be imposed on PRLAs in those areas., Where reclamation is judged to be feasible, the EIS must specify what remedial measures will be required to ensure that reclamation will occur.

Federal and state laws and regulations require reclamation of surface disturbed areas. See the response to comment 4.1 in this section.

* * *

SOILS/RECLAMATION POTENTIAL

4.16 (321) The "low to moderate" reclamation potential suggested for the EIS region should be amended to show a "moderate to high" potential for the southern San Juan Basin, chiefly as a factor of higher rainfall and better soil conditions...

Initial establishment of vegetation has occurred at active surface mines (McKinley, Navajo, San Juan and De-na-zin) in the San Juan Basin. However, long term vegetative studies are not available on plant density, diversity, composition, and reproduction under grazing pressures.

The information on pages 2-17 and 2-18 is intended to present soil limitations within certain soil associations. This information is not intended to infer or imply that all soils found within the EIS region contain these limitations and are unsuitable for vegetative growth.

The "low to moderate" ratings for reclamation potential for the southern portion of San Juan Basin will remain as written. Information is available at the Farmington Resource Area Office on the reclamation potential evaluation conducted for each tract. This information was developed for the site specific environmental assessment prepared for each competitive coal lease tract.

* * *

4.17 (321) The statement that surface mining operations would cause soil compaction is inaccurate. Scarification of the top lift of overburden, followed by application of topdressing and additional scarification and mixing to reduce the soil/overburden interface is a common practice that results in deeper and easier water and root penetration and enhanced vegetation establishment. Also make this correction to the discussion of soils on p. 3-36, 3-41, and 3-45. (Soils, p. 3-29).

This statement refers to soil compaction occurring during all mining activities from initial startup to post-mining reclamation. It is assumed that the procedure noted in your comment would be implemented, as required and specified in individual mine plans, during the reclamation process.

* * *

4.18 (328) The next to the last paragraph states that lack of moisture in the EIS region would make reclamation more difficult than in other parts of the country. This statement should be documented and/or expanded to better support the premise. (page 2-1).

4.18 (cont.) The text has been revised. See the response to comment 4.4 in this section.

* * *

4.19 (328) The description of potential use of sandstone materials as plant growth additives or replacement of pre-existing surface materials should be expanded. As the narrative is written, the implication is that this method would only be useful in badlands. (page 2-15).

Badland soils and topography were used as an example to illustrate the usage of sandstone outcrops in reclamation efforts. This example was not intended to be interpreted as applying only to badland areas.

* * *

4.20 (68) Reclamation potential was a factor in tract ranking, but is not included in Table A-3-2, giving rationales for ranking. Pages 2-15 to 2-18 discuss soil potentials but do not indicate which tracts contain which soils. Absent site-specific data no comparison can be made of alternatives, nor can the public comment on leasing particular tracts. Pages 2-15 to 2-18 suggest that all area soils are unacceptable planting media. What soils are acceptable, if any?

See the response to comment 4.1 in this section. Site-specific data on soil types, potential, limitations, etc will be identified in the mine plan submitted by the lessee. Environmental documents prepared on the mine plan will be available for public review and comment. See the response to comment 4.17 on planting media.

Reclamation potential as considered in the tract ranking is on file for public review in the Farmington Resource Area Office.

* * *

4.21 (68) Soil surveys are required prior to leasing to meet the requirements of 30 U.S.C. 1272(b) (review of federal land for unsuitability for surface mining).

30 U.S.C. 1272 (b) presents the criteria for designating areas unsuitable for surface coal mining. It does not pertain to the unsuitability criteria outlined in the coal regulations or require soil surveys prior to leasing.

* * *

4.22 (68) No estimates are made of sediment yields during and after mining. Table 2-6 does not quantify erosion hazard. Appendices tables B-8 and B-9 do not indicate methodology used, as required by 40 CFR 1502.24. The EIS should note the inapplicability of the universal soil loss equation in the Southwest.

Tables B-8 and B-9 were developed using information from another BLM document prepared in 1981. This reference is noted in the text of the EIS. In this case, methodology should be available for review in the document the information was taken from.

Erosion hazard is defined in the Glossary. See the response to comment 4.1 in this section in regard to sediment yield estimates at the mine plan stage. Universal soil loss???

* * *

4.23 (68) The EIS states that soil productivity will be lost and gained periodically during mining. (3-5). Will periodic gains be due to human inputs, e.g. fertilization?

These periodic gains in soil productivity will result from natural cycles and manmade actions primarily associated with reclamation procedures.

* * *

4.24 (68) The EIS states that experience in similar areas indicates that revegetation can succeed. (1-34). It should name the areas so their true similarity to the lease tracts can be told.

This section is concerned with summarizing major issues raised by the public for each resource component, therefore, specific reclamation information is not included in this section for Vegetation, Livestock Grazing and Livestock Improvements. Additional revegetation information is in the Surface Mine Reclamation section.

* * *

4.25 (68) How does BLM plan to evaluate revegetation success, especially in areas where natural vegetation is clumped between bare areas.

The existing regulatory requirements establish systems for measuring revegetation success and generally require comparison to an undisturbed reference area. See the response to comment 4.1 in this section.

* * *

4.26 (68) Will BLM require revegetation to the present range condition or to a good condition? How will invasion by and dominance of weedy species, e.g. russian thistle (tumbleweed) be prevented?

See the response to comment 4.1 in this section on revegetation requirements. The invasion and dominance of weedy species, e.g. russian thistle (tumbleweed) will be controlled by spraying of herbicides and natural succession.

* * *

4.27 (68) Will BLM require diverse vegetation after mining?

This is an existing regulatory requirement. See the response to comment 4.1 in this section.

* * *

4.28 (68) BLM expects vegetation productivity to return to current levels. (1-25). What data support this? Will diversity also return?

Long term vegetative productivity is expected to return through post-mining reclamation, perennial plant establishment, and adequate precipitation. See the response to comment 4.14 in this section on current productivity levels and diversity.

* * *

4.29 (333) The DEIS should spell out more clearly the consequences of a worst case scenario, rather than giving the impression that reclamation is merely a matter of using proper procedures and time frames, as is suggested by the surface mine reclamation section p. 1-15.

The text has been revised. See Chapter 3 (reclamation potential) for worse case scenario.

* * *

4.30 (333) Studies should be cited, risk factors need to be highlighted, and whether reclamation is the best use for a region with limited water resources needs to be addressed.

The assumption is included in Chapter 3 that mining will not occur if the lessee can not acquire water rights for mining operations, which includes reclamation. Therefore, there is no need for studies and risk factors associated with a lack of water required for reclamation.

* * *

4.31 (349) Reclamation of lands for future land use, needs to be addressed. (page 1-25).

It is anticipated that pre-mining uses would continue after reclamation is completed. To what extent or land will not be known. It is possible that grazing use could not be allowed at pre-mining levels due to family members changing their life-styles because of mining.

* * *

4.32 (356) ...statements made regarding runoff and soil losses contradict discussions on water resources, p. 3-61 of the DEIS.

The statement on page 3-61 does not infer or imply that soil erosion through water action will not occur, but that retention dams will be used to check (slow down) this activity.

* * *

4.33 (357) The EIS should include acreage figures for individual mapping units of both the soil associations and the vegetative types for the region (recognizing they are approximate).

See the response to comment 4.1 in this section.

* * *

4.34 (357) The analysis must provide some indication of the reclamation potential for the area...Develop some approximation of the areal extent from the existing soil association maps...Using one or more of the series of the interpretative guidelines for the use of soil materials in the reclamation of drastically disturbed land...identify those units which have high, medium, or no potential for use in reclamation.

See the response to comment 4.1 in this section.

* * *

4.35 (357) What is the basis for determination of the suitability of the soil or overburden materials for the reclamation of drastically disturbed land.

See the specific requirements in part B of rule 80-1 regarding the New Mexico's coal regulation requirements.

* * *

4.36 (357) What are the dominant limitations in the overburden/soil chemical environment which influence reclamation success? Are

4.36 (cont.) there any potential bio-geochemical problems which could influence livestock thriftiness, such as Cu/Mo deficiencies, toxicities, or aberrations of their normal ratios?

See the response to comment 4.1 in this section.

* * *

4.37 (357) The EIS suggests in several sections that revegetation can be accomplished. Evidence should be cited that such efforts have been attained on similar or related soils and precipitation zones.

The text has been revised. See the response to comment 4.12 in this section.

* * *

5.1 (27) (110) (169) (297) (300) (363) ...Groundwater depletion from Indian reservation lands, over which the State Engineer has no jurisdiction, is not treated. There is no discussion of the legal constraints involved in depleting ground-water on the Jicarilla Apache Reservation or other Indian lands by the...projected coal mines.

Legal questions or conflicts pertaining to who has the jurisdiction to appropriate ground water under Indian reservations are beyond the scope of this document, and are not included in this EIS. Until this question is resolved, we are required to follow existing laws and procedures. The legal constraints in the use of groundwater for the State of New Mexico are listed in Appendix A-5. Direct impacts to all ground water resources from coal mining would be mitigated according to the requirements specified in the New Mexico Surface Mining Act of 1979. Indirect impacts are mitigated by the requirement of the lessee to submit a Plan of Replacement to the State Engineer.

* * *

5.2 (27) (66) (300) ...they tell us next to nothing about how water supplies and water quality for people and livestock will be affected.

The Regional Coal EIS analyzes the impacts of coal development in the San Juan Structural Basin. Impacts to water quantity and quality from the development of PRLAs and competitive coal lease tracts were identified and analyzed in this EIS. Due to the size of this Region and the number of underground and surface waters that were considered for impact analysis, the narrative for this section is general in nature. Specific water quantity and quality impacts to people and livestock will be identified and analyzed in environmental analysis prepared at the mine plan stage of the leasing process. These environmental analysis will be prepared on individual coal lease tracts. Additionally, the New Mexico State Engineer is responsible for protecting the rights of senior water users in the Region.

* * *

5.3 (32) ...the PRLA's would require an additional 12,850 acre feet of water per year and the San Juan River Regional Coal Leasing Tracts would require an additional 3,700 acre feet per year. This particular figure is questionable...because there is too much difference between it and the requirements for the PRLA's with no difference in the acreage involved.

The 3,700 acre feet per year figure is the projected water required for the Target Alternative and not all of the competitive coal lease tracts. All water use figures for these tracts are projections obtained from Minerals Management Service Tract

5.3 cont. Engineering Reports (1982). The 12,850 acre feet of water was obtained from applications submitted to the New Mexico State Engineer for groundwater appropriation by companies holding preference right lease applications. The actual water use may be less.

* * *

5.4 (27) Neither of the EISs...details the cumulative and synergistic effects on water quantity and quality...

See the response to comment 5.2 above.

* * *

5.5 (133) Sections such as Water Quality discuss water quantity, but the quality is omitted. Vague statements are made about particle concentrations, but definitions of types of particles are omitted.

Water quality is discussed on pages 2-18, 2-21, 3-10, and 12 of the DEIS under the appropriate "Water Quality" headings. Impact analysis was concerned with how water quality would be altered with coal development. Impacts were identified for water quality. General statements were made about water-chemistry, mineralization, and dissolved-solid concentrations on page 3-12. A determination of the specific type, degree and locations of water-chemistry changes will be made during the environmental analysis prepared on the mine plan.

The use of "particles" is not an appropriate term. The discussion is concerned with "ions." Information is presented on specific ions that have been considered for water quality in the ground water section of Chapter 3 and Table 2-8 of the DEIS.

* * *

5.6 (99) (155) (205) Where will the water come from to supply the needs of coal mining (19,430 acre-feet per year)...

As is noted on page 3-10 of the DEIS, the primary sources for water will be from the Westwater Canyon Member of the Morrison Formation, Entrada Sandstone, and Gallup Sandstone. Minor sources would be located in sandstones in the Mesa Verde Group. Even though these sources are noted, all appropriations of groundwater in the region are subject to the approval of the New Mexico State Engineer. Approval of new appropriations is

5.6 cont. contingent upon the current use and rights of water holders in the area where applications have been made for ground water.

* * *

5.7 (205) And where do you expect the water to come from to support the additional 17,000 additional people which will reside in the Farmington, NM area by 1990; a direct result of your proposal? Or the ground water for the mining and reclamation processes?

Water for projected population increases to the Farmington area could be obtained from the proposed Anaimas-La Plata Irrigation, if constructed.

* * *

5.8 (99) Where will the irrigation water come from?

See the response to comment 5.6 in this section.

* * *

5.9 (289) (349) The EIS should show how many of various types of improved water sources are on each lease tract, how many people use each, and for what purpose. Chapter 3 should then show the impact of loss of these water sources.

Table 3-19, in the DEIS, outlines some of the water related improvements located on the tracts. See the response to comment 5.2 in this section.

* * *

5.10 (293) (300) It is claimed by BLM that groundwater lost to domestic, stock and municipal supplies due to water table declines caused by disturbance of aquifers by mining operations...will be replaced by...the mining companies...no replacement plans have been filed as of the present...the mining companies...should be required by the BLM and the N.M. State Engineers Office to file water replacement plans, subject to public scrutiny, during the EIS process, prior to BLM approval, and prior to commencement of mining activities.

Mining companies proposing to acquire water from the State of New Mexico are required to submit applications to the State Engineers office. These applications are generally not submitted until leases are awarded to specific companies. Since PRLAs are not subject to competitive lease sales, preference right lease applicants have filed for water rights in New Mexico. Companies interested in competitive coal lease tracts will not file for water rights until the lease sale is completed and

5.10 cont. leases issued. At that time, applications for water rights will be reviewed by the State Engineer and available for public review and protest. Plans of replacement would be submitted by lessees as requested by the State Engineer. Water rights currently held by individuals and companies in the Basin will be considered by the State Engineer in his review and approval of these applications. Mining activities can not begin on any lease before all of the required approvals and permits have been issued by appropriate federal and state agencies, which includes the issuance of water permits.

* * *

5.11 (293) Land subsidence was not considered to be a major problem associated with ground water withdrawal from the deep aquifers,... This issue has not been adequately studied.

Land subsidence could be a potential problem associated with coal development in the San Juan Basin. This problem would probably be most evident in the vicinity of underground mines, especially if dewatering at relatively shallow coal-bearing rocks and surrounding strata were required. Although subsidence potential exists in groundwater basins undergoing pumping stresses, it was not considered to result in significant impacts for mine-related groundwater withdrawals because of:

(1) the great depth of aquifers which would probably be tapped for supplies;

(2) the potential aquifers to be tapped are consolidated sandstone;

(3) the aquifers would not be dewatered, that is, the pore spaces containing water would not be physically drained;

(4) the groundwater withdrawals are not concentrated in a relatively small area, such as in the case of a well field, but are distributed over a large region of the San Juan Basin;

(5) the proposed withdrawals are probably not large with respect to the volume of water in storage;

(6) the withdrawals would not come from a single aquifer, but would be divided amongst three major aquifers, and four or five minor aquifers in the basin.

* * *

5.12 (297) At a minimum, the tribes should be questioned about their plans for water use...Thus, consideration of future plans of the Indian communities must be an important dimension to an assessment of the effects of the proposed federal actions.

The Jicarilla Tribe has been given the opportunity to comment on these proposals and will be consulted again before leasing decisions are made. We agree that the Tribes views are an important consideration. See the response to comment 5.1 in this section.

* * *

5.13 (300) It has not been demonstrated that sufficient natural water will be available for use by residents during mining and post mining...The BLM documents do not contain a rational water management plan and plans of water replacement, treatment and any assurance that increased cost of pumping during mining and post mining, as a result of water level drop, will be borne by the companies.

The text has been revised. See the response to comment 5.10 in this section about water replacement plans.

* * *

5.14 (300) (349) Water management, water use and water replacement plans must be developed prior to leasing or permitting and approved by the Navajo Nation in addition to NM State Engineer's Office.

Until the legal issues are resolved on the Navajo Tribe's claim to ground and surface waters under Indian lands, mining companies would be required to submit applications for water appropriation to the New Mexico State Engineer's Office. The BLM does not have the authority to require mining companies obtain approval for water appropriation from the Navajo Tribe.

See the response to comments 5.1 and 5.10 in this section.

* * *

5.15 (309) ...In fact water availability <u>can</u> be discussed in this EIS and <u>should</u> be discussed.

Water availability is discussed in Chapter 2 in the Aquifers Associated with EIS Region Coal Tracts section, tables 2-7 and 2-8, and Figure 2-5. Potential impacts to regional water levels in major aquifers are discussed in Chapter 3 and are presented visually on plates 1 and 2.

* * *

5.16 (311) Given the situation that well yields are "frequently small," p. 2-18, and that surface water occurs in "limited quantity," p. 2-49, it is not at all clear that there is sufficient water to support reclamation on the PRLA tracts. The Regional Coal EIS does not give a citation for the figures given for water use in the summary of impacts. (p. 3-69). How were these obtained?

The text has been revised. See Appendix B-11.

* * *

5.17 (311) The Regional Coal EIS indicates that disruption of aquifers by surface mining will reduce the recharge rate, but it gives no estimate of the magnitude of the rate's reduction nor of the long-term effect on the size of the aquifer. It also implies that the effect would not be serious because "this impact would be very localized." ...even if the effect on the recharge rate in a particular area is considered to be "localized," the cumulative effect on the aquifer could be significant and should be studied before disruptive mining is permitted.

The recharge rate to any particular aquifer is dependent upon annual precipitation, increased surface use of water, surface disturbing activities that cause compaction and consequently poor infiltration of surface water, reclamation success and the extent of the disruption of an aquifer. Therefore, the exact rate of recharge can not be determined at this time and is not necessary to make a reasoned choice among the alternatives. Projected recharge rates of the disrupted acuifers will be studied and evaluated on the site specific analysis conducted on the mine plan, prior to the issuance of a mining permit.

* * *

5.18 (311) The EIS also indicates that the regional sandstone aquifers would be partially destroyed, and that well yields would be affected correspondingly. However, it does not specify which existing wells would be affected or how extensive the damage to the aquifers would be. It states that water yields would decrease if dewatering of mines were required, but does not indicate which mines are likely to require dewatering or how many wells now exist at the sites of such mines. The Regional Coal EIS purports to project aquifer drawdowns in Table 3-4 and plates 1 and 2, but does not indicate the basis for the projection or the reliability of the model used to make it. These figures do suggest, however, that the cumulative groundwater impacts would exceed SMCRA limitations, a possibility that should be acknowledged explicitly in the EIS.

Analysis of each well located in or adjacent to coal lease tracts is beyond the scope of the regional coal EIS. Addition-

5.18 (cont.) ally, information about existing wells is too incomplete at this time to allow for site specific analysis. Specific well yield and aquifer drawdown impacts and proposed mitigation measures will be analyzed and stipulated at the mine plan stage. The text has been revised to indicate the basis for regional drawdown projections in the major aquifers (see appendix B-11). Reliability of the model and other background data will be available in a U.S. Geological Survey open-file report scheduled for publication later this year.

* * *

5.19 (311) ...the only indication provided that mining will actually use groundwater supplies is the statement that,

> "At each mine, 'deep' wells would be drilled and developed for short-term use for mining operations." p. 3-58.

How does the BLM know that these wells would be drilled?

The text and appendix B-11 have been revised.

* * *

5.20 (311) No description of existing uses is provided...In light of the fact that the EIS estimates that at least 12,850 acre-feet of water per year would be required for PRLA mining, (p. 1-4), it must analyze whether any water is available for that purpose and, if so, what will be the impacts of that water demand on existing uses.

Existing uses are discussed in general terms in Chapter 2. Projected ground water impacts resulting from mining activities on the PRLAs are discussed in Chapter 3 and presented visually on Plate 1. See the response to comment 1.10 on water availability.

* * *

5.21 (311) At a minimum, the EIS must identify what measures are required by existing law so that the costs of compliance therewith may be estimated. It must also analyze whether existing law will effectively mitigate all impacts, or whether additional measures are needed.

Federal and state laws and regulation requirements for water resources are listed in Appendices A-4 and A-5 respectively. Specifically, measures outlined in the New Mexico Surface Mining Act (1979) will be followed in mitigating direct ground water impacts. Measures to mitigate indirect impacts as well

5.21 (cont.) as a Plan of Replacement submitted by the lessee would be submitted for the State Engineer's review and approval.

* * *

5.22 (321) This discussion of impacts of spills of liquid or solid waste material at mining operations fails to consider the mitigating measures that would be in effect as required by each mine's EPA -approved Spill Prevention Control and Countermeasure (SPCC) Plan. (Surface Water Quality, p. 3-63).

Even with such mitigation, the possibility of contamination caused by spills still exists.

* * *

5.23 (321) It is stated that upward leakage of water from the Point Lookout Sandstone may occur as a result of the coal mining operation. Such upward leakage is not expected to occur because the Point Lookout will be depressured in advance of the mining operation. (Lee Ranch Middle Tract, p. A-15).

Potentially significant impacts are identified for worse case analysis in the EIS. It is acknowledged that measures to prevent or minimize this impact may be specified in a companies mine plan. However, if specific measures are not developed and implemented, upward leakage of poorer quality water could significantly lower the quality of water in the Menefee Formation.

* * *

5.24 (321) The discussion refers to the "major aquifers tapped by wells in the area." This should be rewritten to read: "Major aquifers tapped by stock wells in the area." No domestic wells will be affected by this surface mining operation. (Lee Ranch Middle Tract, p. A-15).

The text has been revised.

* * *

5.25 (328) Statements relating to run-off and sediment are far from clear. This section needs to be rewritten, and a further explanation of the delicate hydrologic balance in the San Juan Basin should be attempted. (page 3-63, under the paragraph entitled "Other Alternatives").

At present, insufficient information exists to fully describe the hydrologic system in the San Juan Basin. Current research

5.25 (cont.) projects are being conducted to better define this system. Actual effects are too speculative for meaningful analysis at this time.

* * *

5.26 (328) The discussion of the possible use of irrigation in this arid region, as an enhancer of revegetation potential should be expanded. If widespread irrigation is proposed the effects on groundwater should be traced through this document. (page 2-15, First Paragraph).

The text has been revised. Detailed information on the reclamation potential for areas in the San Juan Basin is available in EMRIA Report numbers 5--1976, 17-77, and 19-78.

* * *

5.27 (328) The description of drainages should be expanded to show that the Arroyo Chico is a sub-drainage of the Rio Puerco of the East. The Rio Puerco East should be clearly differentiated from the Rio Puerco West. (page 2-49, Water Resources, Surface Water).

As is shown in figure 2-A (p. 2-50 of the DEIS), Arroyo Chico is a tributary of the Rio Puerco. All coal tracts east of the Continental Divide lie within the Arroyo Chico Basin. The Puerco River Basin is clearly delineated west of the Divide. Both the figure and text reflect current place names.

* * *

5.28 (328) The La Plata River is also classified as a perennial stream. (page 2-49, Water Resources, Surface-water quantity).

According to U. S. Geological Survey steamflow records, the La Plata River at the New Mexico-Colorado state line (station 09366500) has "no flow at times in many years." The La Plata River near Farmington (station 09367500) has "no flow for long periods in some years."

* * *

5.29 (328) Do the anticipated draw downs, as described, include consideration of the use of groundwater for reclamation? The described draw downs should be verified by the State Engineers Office. (page 3-41, Water Resources).

The model-derived drawdowns do include all anticipated groundwater pumpage related to coal mining. Projected drawdowns are presented on a regional basis, which may or may not occur.

5.29 (cont.) Specific drawdowns by mine would be considered when mine plans are submitted for review and approval. The State Engineer will have an opportunity to review and verify projected site specific drawdowns at that time.

* * *

5.30 (328) The effect of impounding water in evaporation ponds on water rights should be described. (page 3-61, Surface-Water Quantity).

Any effects on existing water rights will be identified when the mining company applies to the New Mexico State Engineer for water rights.

* * *

5.31 (328) In the second paragraph it is stated that groundwater in the region is administered by the New Mexico State Engineer. The surface waters in the area of the report are also under the jurisdiction of the State Engineer but this is not reflected anywhere in the report. (page 2-21, Water Use).

The text has been revised.

* * *

5.32 (328) The statute citation for the State Engineer should be changed from Section "75-21" to..."72-2-1". It is suggested that the purpose stated in the right column be changed to: The State Engineer has general supervision of waters of the state and of the measurement, appropriation and distribution thereof. Other statutes administered by the State Engineer that affect coal development are: Section 69-3-6 N.M.S.A. 1978 Comp. Any person drilling a mine lode discovery hole or mine drill hole to a depth of 10 feet more, and encounters a water body or water-bearing stratum shall plug and report to the State Engineer. Section 72-12-A N.M.S.A. 1978 Comp. Any person desiring to engage in mine dewatering in a declared underground water basin shall apply to the State Engineer for a permit. (page A-65, Appendix A-5).

The text has been revised.

* * *

5.33 (68) (330) Pages 2-18 to 2-24 fail to discuss the extent and "seniority" of current uses in the Coal region: Navajo ranchers, uranium mines, Crownpoint area residents, Chaco Park. These discussions are needed to identify the impacted parties, and the degree of impact of the coal proposals. This section fails to

5.33 (cont.) discuss the importance of the alluvial aquifers to Navajo ranchers for domestic and stock watering uses.

The water resources discussion is presented in a qualitative manner and is, therefore, limitd to the relative volume of water projected for coal mining activities. Current water rights and the appropriated amounts are not presented in this EIS. Potentially impacted permits will be identifed upon receipt and review of applications submitted to the State Engineer. Upon review of existing water allocations and rights, permits will be denied by the State Engineer if there is not enough water available for additional appropriation. General information on the importance of the alluvial aquifer in the region is presented in the Aquifers Associated With EIS Region Coal Tracts section (Chapter 2). See the response to comment %.2 in this section.

* * *

5.34 (330) Impact on springs in the Chuska mountains and need for replacement of these supplies should be discussed on pages 3-8 to 3-10.

The text has been revised. See Appendix B-11.

* * *

5.35 (330) Why is withdrawal of 12,500 acre-feet of groundwater considered an "enhancement" of the productivity of the resource? (page 3-58).

The short-term uses of ground water for coal-related purposes is considered a long-term enhancement because more reliable "deep" artesian wells would be drilled and available for other uses after mining operations are completed.

* * *

5.36 (68) If reclamation will decrease runoff, how will it also decrease recharge? (page 3-8).

Runoff in ephemeral stream channels is assumed to be a major method of groundwater recharge in arid areas, therefore, less runoff would be expected to result in the loss of an unknown amount of water (recharge) back into groundwater systems.

* * *

5.37 (68) The EIS must discuss, or note the lack of, mitigation measures to deal with decreased water availability.

5.37 (cont.) The text has been revised.

* * *

5.38 (68) The EIS should state whether a detailed water quality study such as the one at Colstrip will be done in the San Juan Basin, not merely whether it could be. (page 3-12).

The text has been revised.

* * *

5.39 (68) Comparison of Tables B-6 and B-10 belies the statement at page 3-62 that mine runoff will be of similar quality to stream flows. Significant differences and their impacts should be discussed.

As is stated in the first paragraph in the surface-water quality section on page 3-62 of the DEIS, the quality of runoff from mined areas is subject to State and Federal regulations. Direct comparison of Tables B-6 and B-10 is questionable, since there are no data from water-quality gaging stations in Table B-6 that are directly upstream from the reclamation plots listed in Table B-10. In addition, the values in Table B-6 are mean concentrations; ranges of concentrations are not shown.

* * *

5.40 (335) No indication is given of exactly where the 12,850 acre-feet/year of water which will be required for mining operations will be obtained and whether the rights to this water have already been procured...The environmental and legal consequences of regional and downstream reductions in water should be included in the EIS in order that the full range of impacts can be assessed prior to issuance of the leases.

The text has been revised.

* * *

5.41 (335) The discussion of surface water does not present sufficient information to allow an evaluation of the actual effects of the proposed development...In an area of the country where water is the limiting factor on industrial, agricultural and domestic use of the land, a detailed analysis of this resource should be a prerequisite to approval of any new projects, and therefore should be included in the EIS.

5.41 (cont.) The analysis and approval of permits to mine are discussed in the first sentence on page 3-61 of the DEIS. See the response to comments 5.2 and 5.10 in this section.

* * *

5.42 (335) ...in the discussion of the environmental consequences of mining, there is a description of anticipated physical effects such as "drawdown," and "less recharge" (p. 3-8, 3-11, 3-61), but the EIS does not analyze how the stated effects will impact the environment or the existing users of the water of the San Juan Region. Such discussion is essential to ensure that water critical to preservation of the existing environment is not removed, and that the proposed projects will not violate existing rights.

The text has been revised.

* * *

5.43 (336) There is no examination of the effect of the very heavy drawdowns or groundwater on Chaco Culture National Historical Park's or other municipal supplies.

Impacts on water levels in major artesian aquifers in the San Juan Basin were estimated by using a digital model developed by the U. S. Geological Survey. The regional analysis is generalized with ranges of projected drawdowns. Tables 3-8 and 3--23 summarize these drawdowns. The areal distribution of drawdowns in major aquifers are displayed in plates 1 and 2. Although not mentioned specifically, the National Park Service's well at Chaco Park is located in the Gallup Sandstone aquifer. Impacts to the water level may be derived by plotting the location of this well on the drawdown maps for the Gallup Sandstone. See the response to comment 5.2 and 5.10 in this section.

* * *

5.44 (342) The impacts associated with the destruction of shallow ground water sources have not and should be identified.

The text has been revised.

* * *

5.45 (342) Reference was made to the estimates of Shown and others (1981), page 3-61, in which they report peak streamflow and runoff volumes following surface mining reclamation to be 30 to 70 percent of premining estimates. A range of resultant percentages this large does not provide any information without an explanation of terrain, slope pre- and post-vegetative types,

5.45 (cont.) reclamation measures implemented, changes in infiltration rates, and the applicability of this study to the 39 proposed coal tracts.

Specific information about the percentages is discussed in the paper prepared by Shown and others. Because of the variations in mining techniques and production rates, the applicability of the study to the coal tracts cannot be determined until mining plans are submitted for specific lease tracts.

* * *

5.46 (342) On page 3-10, second paragraph, the reader is directed to refer to the glossary for a definition of aquifer Model Layers 1, 3, 5, 6, and 7. Those definitions, however, are not included in the glossary. The allocation and availability of water for all anticipated future uses in the San Juan Region should be examined synergistically before any decisions are made or actions taken. This may be beyond the scope of this DEIS; yet without considering the San Juan River Basin as a whole, significant primary and secondary impacts may develop.

The text has been revised.

* * *

5.47 (347) The Navajo Tribe has sufficient uses for the groundwater underlying the New Mexico portion of the reservation for development of its coal and other mineral resources, industrial uses, irrigation projects, municipal and domestic supplies, and sheep and cattle ranching...These impacts are not addressed at all in the...SJRRCL EIS and the Navajo Nation is not to be consulted in the taking and use of its waters.

The EIS has been revised to show there is a possibility of conflict between water use plans of the Navajo Tribe and those of water users on public lands. As the EIS explains, the degree of the conflict depends on the rate of development on the lands and the legal availability of water.

* * *

5.48 (349) Data on water supply to local Navajo communities and chapters are not addressed including Navajo water rights. Also the impact of the Navajo Water Rights litigation needs to be addressed. The projected growth and its impact on the water supply of the local Navajo communities and residences need to be projected.

5.49 (cont.) See the response to comment 5.1 in this section.

* * *

5.50 (356) The DEIS also states the Westwater Canyon Member of the Morrison Formation will experience 2,000 feet of drawdown as a result of mining activities. However, Table 2-7, p. 2-22, lists the Westwater as ranging only from 50-800 feet thick. This... comment also applies to other aquifers noted in the discussion of drawdown.

The Westwater Canyon Member in most parts of the San Juan Basin is an artesian aquifer; that is, water contained in this aquifer is under sufficient pressure to rise above the top of the aquifer when tapped by wells. The pressure in the Westwater causes water to rise as much as 4,500 feet (approximately) above the top of the aquifer in some places of the San Juan Basin. In other areas, the water may even flow at the land surface.

For example, the Westwater is tapped by a well in a particular location resulting in the water level rising 4,000 feet above the aquifer. A 2,000 foot drawdown from this well would leave 2,000 feet above the top of the aquifer. This response applies to the other aquifers noted in the discussion of drawdowns.

* * *

VEGETATION/LIVESTOCK GRAZING

6.1 (25) (66) (69) (156) (279) The DEIS does not discuss when grazing will be permitted after the area is mined. The EIS authors make various guesses as to when grazing can be resumed: possibly 2 years, or an estimated two years (p. 3-25); then again they assume that grazing will not be allowed for the life of the mine (20 to 40 years). (p. 3-3).

The text has been revised to correct for the inconsistent statements made on the utilization of areas for livestock grazing after reclamation is completed. Generally, grazing will be allowed to resume on an average of between 20 to 40 years after the area is opened up for surface mining (this takes into consideration the life of the mine plus 5 to 10 years for reclamation). Less acreage would be disturbed for smaller mines, therefore, a shorter time frame would be required before grazing could resume. The actual availability of the reclaimed area for grazing would depend upon the procedures and time frame specified for reclamation in a mine plan and the success of the procedures used to reclaim the area.

* * *

6.2 (68) (69) (328) BLM claims to have no knowledge of livestock numbers or range developments on many BIA grazing allotments (Coal, p. 2-25). Most grazing permits are BIA Tribal permits (p. 2-47). Then again, BIA is said to have provided information on grazing allotments (P. 4-4).

The statement on page 2-25 of the DEIS was written into a preliminary draft of the EIS. This statement should have been taken out of the DEIS. The text has been revised.

* * *

6.3 (279) (299) (311) "...grazing areas shall be relocated within the individual Navajo's current Navajo Chapter." (This)...statement is unacceptable in its present context. The statement is saying that in every Navajo Chapter were mining is potentially to take place and where there is a loss of grazing within the area of mining, the grazing will be shifted to another area within the same Chapter. There isn't any data in the EIS to substantiate this. There definitely needs to be more information and studies attached to the EIS that shows any Navajo Chapter, where mining is a potential, grazing can be increased on the lands within that particular Chapter due to the loss of mining lands without the remaining land being over-grazed.

See the response to comment 15.1 (3) in the American Indians section. Additional environmental analysis would be required

6.3 cont. on a mine plan to identify and analyze site specific grazing impacts projected to occur from the development of a lease.

* * *

6.4 (279) "...4,794 AUM's of forage for livestock for the length of the mine would be unavoidable due to mining." This statement is misleading. Mention should be made that reclamation may take longer than "the length of the mine:.... (page 3-55).

The text has been revised.

* * *

6.5 (279) No mention has been made as to any compensation for the value of animals to those residents who want to cease operations because of adverse conditions or the lack of adequate grazing for their livestock.

There are no legal requirements to provide compensation for livestock. Receipt for the value of livestock would be through the sale of the livestock at current market prices. See the response to comment 15.1 (3) in the American Indian section.

* * *

6.6 (279) The glossary should contain definitions of allotment and should have more details for an AUM. How many head of sheep are equilevent to one cow, etc.

The glossary has been revised.

* * *

6.7 (289) (328) (330) (349) The EIS should show how many families use the lease areas, for how many head of stock, and for what type of stock.

The number of allottees and the number and type of livestock is available for public review at the Farmington Resource Area Office. This information was not included in the EIS because the analysis was done on a regional basis. Analysis will be conducted on specific families (allottees) and the permitted number and type of livestock grazing public land in environmental documents prepared on mine plans.

* * *

6.8 (289) ...most people will be required to sell their stock permits and reduce or get rid of their stock. The EIS must consider the question of what percentage of these families, or their descen-

6.8 (cont.) dants, can realistically return to stockraising on the reclaimed land. This estimate must recognize the percentage of land that cannot be reclaimed, the alteration in carrying capacity imposed by the changed distribution of stock water,...

See the response to comment 6.7 in this section.

* * *

6.9 (68) (289) If people are not to be reimbursed for destroyed fences, corrals, and grazing suspension, the public has a right to be told why not. (page 3-29).

Compensation for livestock facilities would have to be negotiated between the livestock operator and the lessee. Grazing on public land is a privilege held by the permit holder, therefore, there would not be any reimbursement rights on any portion of a permit suspended because of mining activities and operations.

* * *

6.10 (290) (328) Chapter 2 of the EIS...should be expanded to describe existing habitat in the coal region for...Mesa Verde cactus. In addition potential habitats in the PRLA and lease areas for the ...Mesa Verde cactus should be described (pages 2-24 and 2-25).

Known federal Threatened and Endangered and state sensitive plant locales were considered in the analysis conducted for the EIS. None of these plant locales were found to be located in the proposed mine tracts. Stipulations requiring T and E and state senitive plant surveys prior to mining will be included in the lease.

* * *

6.11 (299) The procedures for dealing with grazing allotments are misleading. According to page 3-53, Indians who were going to be relocated "would have sufficient water and forage to accomodate the occupants'/users' displaced flocks or herds." Yet nowhere does the DEIS explain how this will be done. (page 2-47).

See the response to comment 15.1 (3) in the American Indian section.

* * *

6.12 (300) No estimate of grazing area which will be lost (also AUM loss) or impacted due to mining activities has been made.

6.12 (349)) (cont.) See pages 3-39, 3-37, 3-41, 3-42 and 3-46 of the DEIS for estimates of acreages and AUMs lost or impacted due to proposed competitive coal leasing. Additional information is included in the FEIS under the same sections.

* * *

6.13 (321) The EIS mistakenly implies that the only livestock grazing in the EIS region is done by Navajos. This is not true, and the EIS should reflect the extent of the Anglo and Hispanic ranching operations especially in the Lee Ranch and Divide areas. (Livestock Grazing, p. 2-24).

The analysis for the coal EIS was conducted on a regional basis. The amount of discussion for any aspect of a resource is determined by the identification of significant impacts. In this case, significant impacts have been identified to occur primarily to Navajo livestock operators. The extent of the ranching operations impacted in the Lee Ranch and Divide areas is incorporated into the total number of impacts projected to occur in the amount of public land (acres) disturbed and AUMs unavailable for forage.

* * *

6.14 (321) (328) It is inaccurate to imply that livestock grazing would be eliminated for a given area over the entire life of a mining operation. Once reclamation has been satisfactorily completed for a portion of a permit area to the standards of the regulatory authority for bond release, livestock grazing could begin anew. Also make this correction to the discussion of livestock on pages 3-3, 3-37, 3-41, 3-46, and 3-56. (Livestock Grazing, p. 3-29).

Text changes have been made which identify acreage and AUMs as being temporarily lost and not necessarily lost for the life of the mine. The potential does exist for a limited return of livestock grazing on those portions of a permit area reclaimed to the standards of the regulatory authority for bond release.

* * *

6.15 (321) It is stated that impact to the range resources would involve the "loss" of 255 AUM's/year of native forage. This statement should be amended to read that impact would involve "the <u>temporary</u> loss" of 255 AUM's per year of native forage. (Lee Ranch East Tract, p. A-14).

6.15 (cont.) The text has been revised.

* * *

6.16 (321) ...it is not expected that 1,606 AUM's/year will be temporarily lost because of mining operations. This figure should be 280 AUM's/year.

The number of AUMs of forage that will be temporarily lost is 1,606 AUMs over the life of the mine. The AUM figures are correct for the data that is available.

* * *

6.17 (328) What steps will be taken to ensure that the current grazing permittees, or their heir(s) retain the grazing privileges on mined lands after reclamation is completed?

Grazing privileges of current permittees can be protected under Section 402 (c) of the Federal Land Policy and Management Act of 1976 (FLPMA) which in part states "the holder of the expiring permit or lease shall be given first priority for receipt of the new permit or lease." AUM's can be placed in suspended non-use until such time as reclamation is adequate to support a portion or all of the previous livestock utilization.

* * *

6.18 (330) (349) The probability that residents will lose access to grazing areas or water sources because of the building of fences or roads is not discussed.

It is anticipated that (1) the construction of roads would provide additional access to water sources and grazing areas. and (2) access to grazing areas and water sources would be denied to all but individual livestock operators for as long as grazing is allowed within an area fenced off for mining activities.

* * *

6.19 (330) (349) This DEIS gives little information on range improvements or grazing leases...Wells off the tracts that would be impacted by mining are not counted or listed...

The cumulative regional range improvement impacts (and unavailable AUMs) are listed in Table 3-19 on page 3-30 of the DEIS. Specific information on range improvements and grazing leases is on file in the Farmington Resource Area Office. Site

6.19 (cont.) specific range improvement and grazing permit impacts will be analyzed in the environmental analysis prepared on the mine plan.

Wells that would be removed or disrupted from mining operations would be replaced or repaired. Stipulations to ensure State Engineer requirements to protect or replace existing wells on or off of the coal lease tract will be included in the coal leases. Because of state requirements and the stipulations that will be included in the coal leases, significant unmitigated impacts to wells were not identified in the coal EIS.

* * *

6.20 (345) The statement is made that...."It is anticipated that an unknown number of Navajo families from the former Navajo-Hopi Joint Use Area in Arizona will be settled on lands selected by the Navajo Tribe on or around competitive coal lease tracts. Any additional settlement may increase the existing demand for grazing use areas and the number of conflicts over grazing boundaries." The only lands selected by the Navajo Tribe in New Mexico are within the Paragon Resources Ranch area and this ranch is presently operated by Public Service Company of New Mexico and, to our knowledge, no Indians are grazing stock with in the Ranch boundaries,.... (paragraph 5, page 2-47).

The text has been revised

* * *

WILDLIFE

7.1 (17) Federally endangered species and certain game species are adequately treated in the San Juan Regional Coal EIS, but datum for other wildlife species within the area are lacking. This lack of information limits your ability to measure the impacts on those species.

The discussion of those species that were included in the EIS was limited to those that would be significantly impacted to coal development. Therefore, if there is no discussion on other wildlife species, it is because it was determined that significant impacts would not occur.

* * *

7.2 (169) Your discussion of impacts on endangered species is inadequate, particularly as it was limited to narrowly defined geographic areas. Our Reservation supports several protected species including bald and golden eagles and peregrine falcons which we fear may suffer if the proposed actions are undertaken. These adverse effects will not be a direct result of construction activities but rather will occur as the increased population those activities bring to the area encroach upon the animals' habitats. We are also concerned that your studies failed to adequately address area-wide impacts on such species from chronic exposure to pollutants generated by the proposed projects. Such exposure may be either direct or indirect through the food chain or habitat reduction.

The sections concerning wildlife are certainly brief, however, the length of discussions are functions of significance rather than a lack of information. The wildife sections addressed only those species most significantly impacted: nesting raptorial birds, big game, winter range and threatened or endangered species. In situations where data was lacking, surveys for species will be required as in the case of the black-footed ferret and endangered cacti. This approach has been approved by the U.S. Fish and Wildlife Service (USFWS) through Section 7 consultation procedures.

We were sensitive to secondary impacts to wildlife in off-site areas, particularly T&E species. Coordination with USFWS concerning critical habitats in areas potentially affected by the proposed action did not result in the identification of any critical areas on the reservation such as black-footed ferret evidence or nesting areas for peregrine falcons or bald eagles. Impacts dealing with total suspended particulates and acid rain effects were discussed in the Draft Environmental Impact Statement on PNM's Proposed New Mexico Generating Station and Possible New Town. Pages 3-3 thru 3-6 of the DEIS dealt with

7.2 (cont.) the concerns and negative impacts that could be expected in areas with high mountain lakes.

* * *

7.3 (290) Chapter 2 of the EIS...should be expanded to describe existing habitat in the coal region for the bald eagle...In addition, potential habitats in the PRLA and lease areas for the black-footed ferret...should be described. (pages 2-24 and 2-25).

The text has been revised.

* * *

7.4 (290) Chapter 3...should include discussions of impacts or potential impacts to threatened or endangered species. Secondary and cumulative affects due to coal mining, related projects, and increased human populations should also be considered. (pages 3-12, 3-14, 3-54, 3-55, 3-56, 3-57, and 3-69).

The text has been revised.

* * *

7.5 (290) Application of Unsuitability Criterion number 9 pertaining to endangered species should be clarified on pages 1-13, A-71 and A-72. Full application of Criterion number 9 has been deferred due to the lack of survey data. Pages 3-1 and A-73 should mention appropriate stipulations requiring endangered species surveys and compliance with the Endangered Species Act of 1973.

All of the unsuitability criteria have been applied. The text has been revised. Committed and proposed mitigating measures are located in Chapters 1 and 3 respectively. PRLA stipulations are listed in Appendix I-2. See the response to comment 7.1 in this section and 16.18 in the General Comments section.

* * *

7.6 (290) Fish and Wildlife Service records indicate that one additional ferruginous hawk nest may be impacted by issuance of PRLA's and that one additional ferruginous hawk and one additional golden eagle nest occur on proposed coal tracts. The tables on Page A-75 should be corrected to include these nests as well as the additional buffer zones needed for protection. The draft EIS should be changed to reflect the number of nests impacted and the number of acres needed to protect nests (Pages VIII, IX, X, 1-25, 1-29, 2-25, 3-13, 3-37, 3-38, 3-42, 3-46 and 3-53). Stipulations may be required on PRLA numbers 3834, 3835, 3919, and 11916 to protect nests from mining impacts. Adjustments to the Hospah and Nageezi Tracts may be required to protect nests.

7.6 (cont.) The text has been revised.

* * *

7.7 (290) Big game (deer) habitats may be affected by coal mining in the Twin Buttes, Pinehaven and Bread Springs Tracts. These habitats should be considered in the discussion of wildlife impacts. (pages 3-42 and 3-46).

Data was not available to the BLM that indicated important or critical big game habitat would be impacted on the Twin Buttes, Pinehaven or Breadsprings tracts.

* * *

7.8 (290) Other pertinent Acts that should be included under the wildlife category are the Surface Mining Reclamation and Control Act and Migratory Bird Treaty Act. (Appendix A-4, page A-63).

The text has been revised.

* * *

7.9 (300) ...All the lands have not yet been surveyed to determine the presence of and impacts on the various endangered species. The information that was provided does not adequately describe the baseline information. Navajo Game & Fish does have limited information on several Threatened and Endangered Species that could be impacted. This information was not considered in the draft EIS or other documents...Mitigative plans are not discussed in detail. In depth biological investigations should be conducted to detemine the extent of all wildlife in the proposed impact area.

The Section 7 consultation procedure is a continuous one. OSM is required to comply with the Threatened and Endangered Species Act, therefore, additional analysis will be necessary at the mine plan stage. If the Navajo Game and Fish department has information on T&E species that would be impacted by the proposed action or alternatives, it is their responsibility to provide it whether it is solicited or not.

* * *

7.10 (68) Wildlife use is postulated post-mining. The only discussion of how to achieve this is a citation in Appendix A-4 to federal law requiring such use. There is no indication whether this will involve the use of stocking, hunting regulations, particular vegetation, water development, or other means.

7.10 (cont.) Post-mining wildlife use would be totally dependent on reclamation using native plants and the reintroduction of lost waters. Wildlife use after mining would probably be the same, over time, as that use before mining.

* * *

7.11 (68) A list of potential threatened and endangered species occurrences in the area should be included to guide later, more detailed surveys. (page 2-24).

A listing of the species considered is included in Appendix D-1.

* * *

7.12 (335) The MFP update brochure stated that 3,710 acres had been found unsuitable under criteria 11, 12, 13, 14 with most of the acreage located in the La Plata area. However, in the SJRRC EIS, only 75 acres are listed as unsuitable under criteria 11, and 115 acres are listed as unsuitable under criterion 14. No acreage is listed as unsuitable under either criterion 12 or 13 and further, no part of the La Plata tracts were found unsuitable.

The areas determined to be unsuitable were listed before the competitive tracts were delineated. The unsuitable areas listed under 12 and 13 and the "La Plata area" in the Chaco MFP are not located in competitive coal tracts.

8.1 (76) (100) (235) (206) (289) (303) (349) It is equally important to know what kinds of sites will be affected in any given area. This information is not included in any of the documents. ...the Coal EIS...provides tables listing numbers of the affected sites by what amounts to cultural and historical site types, but these data are not adequate to address the problems of assessing the possible significance of these sites. One needs to know whether they are lithic scatters, base camps, et cetera.

Due to the number of sites, a general summary has been provided by cultural affiliation rather than specific site type. Without a complete inventory of each tract we can not determine the exact number or type of sites in each cultural period or group. Significance is determined through National Register eligibility. All recorded sites on public lands within the tracts have had their eligibility determined. Once the other sites in the tracts have been located and recorded through inventory, their National Register eligibility will be determined. Since the lease terms require the lessee to protect cultural resources by appropriate study or in-situ protection, more detailed information is not necessary for a reasoned decision at this stage.

* * *

8.2 (76) (303) ...the (Coal EIS mentions) only selected sites in connection with the National Register and (there is no discussion on) the number of sites found significant on other grounds such as scientific or economic.

The National Register of Historic Places has four criteria for evaluation of sites for possible inclusion:

> National Register Criteria for Evaluation.
> The quality of significance in American history, architecture, archeology, and culture is present in districts, sites, buildings, structures, and objects of State and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and
>
> (a) That are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) That are associated with the lives of persons significant in our past; or
>
> (c) That embody the distinctive characteristics of a type, period, or method of

8.2 cont. construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(d) That have yielded, or may be likely to yield, information important in pre-history or history.

All of the sites found eligible for inclusion in the National Register within the tracts have been found to qualify under Criteria d. One site may also qualify under criteria A. Criteria d addresses the informational values contained within a site and its associated environment, which includes a sites scientific values. The economic value of a site currently can not be objectively applied. Recent evaluation of sites in monetary terms has only been determined in cases where the site has been vandalized and payment for damages is attempted.

* * *

8.3 (68) (76) (340) The mitigating measures relating to cultural resources were too vague.

Federal laws and regulations provide for protection and mitigation to cultural resource impacts. Mitigating measures are additional actions proposed in addition to the federal laws and regulations. These requirements are clear and require a class 3 survey before mining will be allowed. The mitigating measures for cultural resources were developed to provide additional protection in the form of a buffer zone and fencing for the Pierre's Ruin Community which would not be covered under present laws and regulations.

* * *

8.4 (68) (76) The DEIS provided no commitment to survey 100 percent of the PRLA and competitive leasing tracts...

(235) (289) (303) (304) (328) (335) (340) (349) (316) See Appendix I-1, Special Stipulations, Section 31. We interprete this section as requiring 100% intensive inventory before mining. On page 1-15 of the DEIS the statement is made that inventories will be required. An assumption specifying the inventory to be conducted for Cultural Resources has been included in Chapter 3. The statement is also made in Chapter 3, under mitigating measures, that a complete inventory is a standard operating procedure and will be conducted before mining permits are issued for the alternative selected by the

8.4 (cont.) Secretary. It is also acknowledged that mitigation plans will be developed as needed from the completed inventories.

* * *

8.5 (95) ...the BLM statement in Chapter 3 is contrary to the position adopted by the Regional Coal Team and the National Park Service. ...Salt River Project submits the action recommended on page 3-51 in Chapter 3 is improper and should not be implemented and included in the Environmental Impact Statement.

The buffer zone and fencing has been proposed to provide additional protection from mining impacts and to provide protection in accordance with the surrounding area. These measures are provided for additional consideration by BLM management prior to sale of the Nageezi tract.

* * *

8.6 (100) (206) (235) (303) (308) ...the discussions of cultural resources center on the complex Chacoan system, including Chaco Canyon, the outliers, and the road system. ...it is no more important than evidence of other human use of the Basin. This fact is not adequately dealt with in any of the documents.

The amount of discussion given to any aspect of a resource is determined by the identification of significant impacts to the resource, particularly impacts that can or may not be mitigated. The statement is made on page 3-1 that impact analysis deals only with the cumulative significant impacts resulting from the construction of facilities and the mining of federal coal. This approach, as required in the CEQ regulations, may seem to present certain areas or aspects as being more important than others, which is not the case.

* * *

8.7 (133) The DEIS should cite the Programmatic Memorandum of Agreement of May 5, 1980, under Criterion 7. (page 1-15).

This section is a summarization of the Unsuitability Criteria. Criteria number seven is concerned with the amount of federal coal that would be available for mining after cultural resource considerations. The Memorandum of Agreement (MOA) is concerned with which federal agency will assure all federal laws and regulations are taken into account before and during coal mining. Therefore, it is not appropriate to include the MOA under Criterion 7 of the Unsuitability Criteria. The MOA

8.7 (cont.) covers the degree of pre-lease issuance required for cultural surveys and is on file in the Farmington Resource Area Office.

* * *

8.8 (133) The scope should be expanded to include all cultural resources. (page 1-20).

This section is concerned with summarizing major issues raised by the public for each resource component; therefore, not all cultural resources are noted in the section for cultural resources.

* * *

8.9 (133) Under "Gravesites"--Reference should be made to the Secretary's "Guidelines for Human Burials" and the Joint Resolution on American Indian Religious Freedom Act (P. L. 95-341) and should be included or reproduced in total. (page 1-36).

This section of Chapter 1 is concerned with summarizing the impacts that could occur to resource components from the leasing and mining of federal coal. Reference to the Guidelines for Human Burials and the American Religious Freedom Act are concerned with legal requirements for human burials and other similar Indian religious practices; therefore, this material is not appropriate for this section. The Secretary's Guidelines for Human Burials and the American Religious Freedom Act are included in Appendix A-4, Federal Laws and Regulations Affecting Coal Development.

* * *

8.10 (133) The division into five temporal/cultural periods is unworkable. There is a need to subdivide in subsequent paragraphs. The Paleo-Indian period should be subdivided as should other divisions. (Chapter 2--"AFFECTED ENVIRONMENT").

The temporal/cultural periods discussed in the DEIS is a summary from lengthy discussions of the cultural sequence of mans occupation in the San Juan Basin. The references for the documents used to extract this data are given in Chapter 2 in the Cultural Resources section. The text will remain as it is written.

* * *

8.11 (133) "larger animals" is a vague term. It is unclear whether paragraph one refutes the idea that "climatic change" did not play a part in Pleistocene faunal extinctions. (page 2-26).

8.11 (cont.) The text has been revised.

* * *

8.12 (133) Two concepts are combined into existing paragraphs, these are discussion of the Navajo and Euro-American entry into the San Juan Basin Area. We suggest expansion of both subjects, Navajo and Euro-American entry. (page 2-26, paragraph 3).

These concepts were summarized into one paragraph due to the availability of the information in other documents. See the references listed under the Cultural Resources section in Chapter 2.

* * *

8.13 (133) A jump has been made from a discussion of sites to components without identifying how many total components are being considered. (page 2-26, paragraph 7). (2-26D)

The text has been revised.

* * *

8.14 (142) (235) (272) (301) (303) The...DEIS does not contain information (other than the 1981 Kemrer report) on what cultural resource inventories or data were used to predict site occurences, and no information is given on which of the Competitive Lease Tracts were inventoried.

Within the San Juan Basin numerous archaeological inventories have been conducted for surface disturbing activities, research projects, and projects oriented to produce management data. Therefore, limited cultural resource inventories have been conducted on most of the tracts and surrounding areas. In response to public comment on the existing level of inventory the BLM conducted a 10 percent sample survey of 18 of the tracts and the School of American Research conducted a 15 percent sample survey of two tracts. Several of these inventories have produced predictive models for portions of the basin. The predictive models produced by Kemrer covers all or portions of six competitive lease tracts (Kimbeto #1, Bisti #1, Bisti #2, Bisti #6/8, Gallo Wash #1, and Gallo Wash #2) and most of the PRLAs. Data from Kemrer was combined with extrapolated known site densities from inventories on and near nine (Kimbeto #1, Kimbeto #2, Bisti #1, Bisti #2, Bisti #4, Bisti #6/8, Gallo Wash #1, Gallo Wash #2, and Nageezi) tracts to arrive at a projected site occurance. Data from known surveys were utilized for the remaining tracts. References for all known inventories within or near the tracts that were used for projected purposes are on file at the Farmington Resource Area Office.

* * *

CULTURAL RESOURCES

8.15 (160) (235) ...1,800 archaeological sites will be destroyed. How will these be studied or otherwise saved for future study?

Cultural resources sites are protected through federal laws and regulations. Among them are those which assure that federally authorized actions take into account the effect of the undertaking on significant cultural resources (NHPA Section 106). Significant resources are those which are included in, or eligible for, inclusion in the National Register of Historic Places. Appendix I-1, Standard Lease Form, Section 31, Special Stipulation, assures that federal laws and regulations requiring inventory for cultural resources will be followed before surface disturbing activities begin. We interpret inventory to be a 100% inventory. Page 1-15 of the DEIS provides for protection for sites to be preserved in place. Additional mitigative measures on page 3-51 of the DEIS provide for additional protection to the Pierre's Ruin Community through a buffer zone and fencing and where necessary, sites will be protected from surfrace mining.

* * *

8.16 (272) BLM should indicate whether the proposed actions are in substantial conformance with the proposed Chacoan Protection Sites Management Plan. The EISs should address potential impacts to individual protection sites which are outside lease tracts, but may receive increased secondary impacts because of their proximity to proposed roads to other development areas.

The text has been revised.

* * *

8.17 (272) In discussing the Azabache Stage Station, the draft EISs mention that blasting in the vicinity may weaken existing standing walls. It is my understanding that this site was to have been withdrawn from leasing, with an adequate buffer zone to protect it from impact. If blasting impacts pose additional hazards in this lease tract, provisions for a blasting monitoring plan should be included as a stipulation of leasing.

Chapter 2 has been changed to reflect the withdrawal from leasing of the Azabache Stage Station. An alternative mitigating measure has been included to monitor the affects of blasting on this historic structure. Secondary impacts resulting from blasting and proposed mitigating measures will be identified and analyzed in environmental documents prepared on specific mining operations for leases located adjacent to the Azabache Stage Station.

* * *

8.18 (206) In this Draft EIS not enough information is presented to allow anyone to evaluate the consequences to archaeological resources, or to compare the consequences of the various alternatives...This Draft EIS postpones compliance with Section 106 of the National Historic Preservation Act of 1966.

Refer to Chapter 1, Comparison of the Alternatives and PRLAs, and Table 1-8 for a comparison of the alternatives. Section 106 compliance must be completed prior to the issuance of the final Environmental Impact Statement. See the cultural resources discussion presented under the PRLA and Bypass alternatives. Our actions are consistent with the Programatic Memorandum of Agreement with the National Council on Coal Leasing and meet the 106 requirement.

* * *

8.19 (206) (303) National Register criteria is not addressed and cannot be addressed given the information provided in the EIS document.

Section 106 compliance or a determination of the National Register eligibility determinations are conducted seperately from the EIS process. The results of eligibility are then incorporated in to the environmental impact statement. Information required to determine National Register eligibility is on file in the Farmington Resource Area Office but is not provided in the EIS.

* * *

8.20 (206) 40 CFR 1505.2(c) requires an EIS to "state whether all practicable means to avoid or minimize environmental harm from the alternative selected have been adopted, and if not, why they were not." This has not been done. There is nothing in this EIS that lets us know whether or not any salvage excavations will be conducted, which sites will be preserved, which sites will be destroyed without any mitigating measures, how much money will be committed to historic preservation measures, and why and why not.

The quote from the CEQ regulations (40 CFR 1505.2(c) is correct. However, section 1505.2 pertains to the requirements in preparing the Record of Decision and not the EIS. The Record of Decision is issued after the final environmental impact statement is completed. The type of information requested in your comment would not be available until proposed mining operations are developed and a resulting mine plan submitted for a mining permit from the State of New Mexico. A mine plan would be submitted for each lease issued in a competitive coal lease sale or PRLAs. The general principles to govern these later

8.20 (cont.) (289) determinations are all that is required now for a reasoned choice among the alternatives.

* * *

8.21 (289) The Cultural Resources section contains no mention of whether any sites on the competitive lease tracts, except for Pierre's Ruin Community, are on or eligible for the National Register.

Table 2-9 lists the National Register eligibility of all sites on federal surface or surface overlying federal coal (except Indian surface).

* * *

8.22 (289) Cultural resource impacts should be addressed here but they are not. (page 3-4, ff., Impacts—No Action Alternative).

The text has been revised.

* * *

8.23 (301) ...Table 2-9 (p. 2-27) fails to indicate the existence of a Chacoan road that passes through Bisti #1 and probably Bisti #4.

The text has been revised.

* * *

8.24 (303) The draft EIS does not reveal the exact proportion of the acreage that has actually been inventoried by pedestrian survey methods...

Table 2-9 presents the percentage of each tract actually inventoried by standard on the ground survey methods.

* * *

8.25 (304) The EIS analysis should address the requirements of P. L. 96-550 more thoroughly.

The EIS does not analyze the requirements of public laws and regulations. Such requirements are considered and appropriate narrative is included in the environmental document. Pierre's Site is the only Archaeological Protection Site (P.L. 96-550) within a competitive lease tract or PRLA. The requirements of this law have been considered and mitigating measures have been proposed to eliminate impacts to this site.

* * *

8.26 (308) The data base utilized in Table 2-9 is not documented in the text. A responsible presentation of this data should inform an otherwise ignorant reader that until very recently the La Plata data base had been formulated in the 1920' and 1930's. The early archaeological recordings provide minimal data that is not compatible with modern research techniques. An analysis of the sample size is absent from the report. How can the sample size and the resulting predictions be evaluated without proper documentation and evaluation of the quality and quantity of data?

Because of the length of references utilized for all of the tracts, this listing was not included in the Reference portion of the DEIS. A list of all the cultural resource inventories utilizied to determine the predicted site occurances within and near the La Plata tracts is available in the Farmington Resource Area Office.

Site data from four prepared reports and one presently being prepared for publication were utilized in the analysis conducted on the La Plata tracts. Publication dates on these reports range from 1977 to the present. Only one site within the tracts was recorded before 1977. Therefore, the latest available data was utilized.

Documentation and evaluation of the quality and quantity of data utilized in the environmental impact statement does not have to be included in the document. All background information and data utilized in the prepartion of the statement is kept as file material in the office were the document was prepared. The information used in any environmental document is available for public review.

* * *

8.27 (321) The data given for Lee Ranch West should show that 46 percent of the area of this tract has had an archaeological inventory during the period 1980-1982. (Table 2-9, p. 2-27).

Table 2-9 has been revised. The information presented in Table 2-9 is primarily for those sites and inventories conducted on public land or other surface ownership overlying federal coal. The majority of the cultural resource inventory in the Lee Ranch tracts has been on private surface overlying private coal, therefore, these results were not included in Table 2-9.

* * *

8.28 (321) The fifth paragraph indicates that a suspected Chacoan Road passes through a portion of the Lee Ranch West tract. The EIS must show that further intensive research has revealed that no

8.28 (cont.) surface indication of this suspected road was ever found, and this road is no longer believed to have ever existed. (Cultural Resources, p. 2-28, 3-37, 3-38, and A-17).

The text has been revised.

* * *

8.29 (321) With respect to Anasazi "agricultural soils" on Lee Ranch East, West, and Middle and the Divide tracts, it should be noted that the surface is primarily privately owned and that the federal interest is accordingly limited. (see comment 470.38). (pages 3-37, 3-38, 3-42, and 3-47).

"Agricultural soils" must be considered and analyzed for federal coal under private surface, even in limited quantities. (NHPA Title 1, Sec. 110(d), 36 CFR 800, EO 11593, NEPA Sec. 102 (2)(c), 40 CFR 1500 et. al.).

* * *

8.30 (321) The archaeological inventory performed by the School of American Research for the Lee Ranch Mine, and subsequent inventories, have revealed no Anasazi farming communities at Lee Ranch. It is improper for the Draft EIS to infer that the mere presence of a soil type is evidence of the presence of cultural respirces in a site specific sense, although such an inference could be made on a regional basis. (Cultural Resources, p. 3-42).

The text has been revised.

* * *

8.31 (321) This section should list the various laws, civil and criminal, prohibiting removal or destruction of cultural resources. (Mitigating Measures-Cultural Resources, p. 3-50).

This section is concerned with providing additional measures to mitigate impacts and not legal requirements of laws and regulations. The BLM is required to comply with all appropriate laws and regulations. Legal requirements are, therefore, not listed within the text of the EIS. Information on applicable laws for cultural resources are listed in Appendix A-4.

* * *

8.32 (328) In various sections of the Coal Lease DEIS...statements are made which recognize the existence of federal, state, local, and tribal laws and regulations concerning cultural resources,

8.32 (cont.) but nowhere in any of the documents is there an explicit statement that the spirit and intent of these laws...will be implemented...

The text has been revised. Also, see the response to 8.31 in this section.

* * *

8.33 (68) How does the inventory requirement relate to the statement that uninventoried sites will be destroyed? (p.1-34).

This statement is concerned with cultural sites located outside of the competitive coal lease tracts and PRLAs were inventories would not be required or conducted. The text has been revised to clarify this statement.

* * *

8.34 (68) The EIS does not indicate how BLM will decide which sites require in situ-protection. Will decisions be based on age or size of sites, degree of interference with mining, or other criteria?

Sites which may require in situ preservation will be determined through consultation between the BLM and the State Historic Preservation Office during the determinations for National Register eligibility, which are outlined in the response to comment 8.1 of this section.

* * *

8.35 (336) Mitigation measures for cultural resources include no mention of archeological mitigation of sites to be destroyed. (page 3-51).

The text has been revised.

* * *

8.36 (336) The statement that "no surface subsidence would occur" is an assertion without foundation, not...mitigation (page 3-51).

The text has been revised.

* * *

8.37 (340) If numerous comments have been received regarding the potential adverse affect to the area's cultural resources and "some individuals felt these impacts could be mitigated" what other comments concerning the results of the coal development actions on

8.37 (cont.) the cultural resources were expressed, particularly regarding the potential for adequate mitigation?

Some individuals commented that they felt all adverse effects to most cultural resources could be mitigated through intensive survey and data extraction.

* * *

8.38 (300) (349) Blasting vibration may also cause damage to the archaeological, fossil and other fragile resources. . . Mitigative mesures are not discussed or inadequate and unclear and no lease stipulations have been developed to eliminate or minimize these problems.

The text has been revised alternative blasting mitigating measures have been added to Chapter 3.

* * *

8.39 (335) Criterion 7 in its present form requires that sites eligible for inclusion in the National Register be unsuitable for surface mining unless consultation with archaeological agencies results in a determination that mining would not result in significant impacts to properties. However, not a single site is mentioned as unsuitable under Criterion 7.

National Register eligibility was determined for all recorded sites in the competitive lease tracts in consultation with the New Mexico State Historic Preservation Officer. Also in consultation with the SHPO a determination was made for each eligible site as to whether or not adverse impacts could be mitigated through data recovery. If mitigation could be effective, the site was considered to be an exception to unsuitability criterion 7. Then properties were found which warranted in-site preservation (that is potential adverse effects of surface mining could not be mitigated through data recovery). These sites and the procedures used in making these determinations are discussed in Chapter II and in Appendix A-11.

* * *

VISUAL RESOURCES

9.1 (300) (335) Within the discussion of possible mitigation measures (SJRRC EIS p. 3-51) it is stated that "all surface disturbance...will be reclaimed to a scenic quality eligible for their pre-mining VRM Class or better."...Further discussion as to how the area will be re-claimed is necessary before an assessment of the long term visual impacts can be made. Of even more importance, there is no discussion of mitigating the visual effects of the mining during the 20-40 year life of the mining operations... There is no commitment in the document about if, how and when mitigations will take place.

See the response to comment 16.10 of the General Comments.

* * *

9.2 (310) In the Visual Resources section, BLM states that "Compliance with OSM regulations would usually ensure the regional scenic quality." (p. 3-51)...What is BLM going to do about guaranteeing scenic quality?

See the response to comment 16.10 of the General Comments.

* * *

9.3 (336) Again there is no reference made to visual resources at Chaco Culture National Historic Park. (page 2-30).

The text has been revised.

* * *

9.4 (356) ...the extent of the affected badlands, their specific visual quality, or hypothetical effects on visual quality on the adjacent Bisti WSA/ACEC have not been quantified in this statement.

The text has been revised.

* * *

9.5 (356) ...the term "Bisti/De-Na-Zin ACEC (proposed)" is not used consistently with prior discussions relating to "Bisti Management Area" (p. 2-33 and p. 3-56) and "Bisti WSA."

The Bisti WSA and the Bisti Management Area are actually the same area. The term WSA infers simply that an area possesses wilderness characteristics. The management area term is used to signify the fact that there are other management designations in effect for the area, basically due to the recreation, scientific, and scenic values. "WSA" is used mostly in discussions of impacts to wilderness character while "management area" is used in some discussions of impacts to the area

9.5 (cont.) other than just those to wilderness character. The Bisti/De-na-zin ACEC encompasses a much larger area and is a type of management designation independent of WSA status.

* * *

WILDERNESS

10.1 (98) ...a buffer zone, temporary buffer zone of immediate release on coal leases be considered that abut the north, northwest, and east sides of the Bisti as it is shown in the most recent surveys...An enclave or an abutment in the De-na-zin area and also that area which involves the Ah-shi-sle-pah,...

It is the Department of Interiors policy that buffer zones are not to be considered around wilderness areas. The BLM wilderness Management Policy of September 1981 says,

> No buffer zones will be created around wilderness areas to protect them from the influence of activities on adjacent land. The fact that non-wilderness activities or uses can be seen or heard from areas within the wilderness shall not, of itself, preclude such activities or uses up to the boundary of the wilderness area.

* * *

10.2 (133) ...numerous references are made to areas designated as wilderness, but there is no indication as to whether these areas would be leased. If these (or adjacent areas) are leased, there may be a need for special stipulations that will be included in these leases. This is not addressed in the DEIS.

Three areas have Wilderness Study Area designation on them (Bisti, De-na-zin, and Ah-shi-sle-pah) as is presented on page 1-14 of the DEIS. As is noted on Table 1-5 of page 1-14 and text on page 1-15, Wilderness Study Areas are unsuitable for surface coal mining and no surface facilities or subsidence are allowed for underground mining. Therefore, until a determination is made by Congress on designating these areas as wilderness, leases allowing surface coal mining operations can not be issued. As for areas adjacent to potential wilderness, or buffer zones, see the response for comment number 10.1 above.

* * *

10.3 (309) "Existing coal lease NM-0186615 and...NM-0186612 are in close proximity to the Bisti WSA." This sentence omits any mention of NM-0186613, which overlaps the Bisti WSA, or PRLAs NM6801, NM11916, NM3838, and NM6802, all of which are in "close proximity" to the Bisti WSA. It also ignores the existing Gateway mine bordering the Bisti WSA. (p. 3-14).

Coal lease NM-0186613 is addressed in the assumptions section on page 3-3. PRLAs NM 6802 and NM 3838 were both considered far enough from the WSA to not directly impact the wilderness

10.3 (cont.) characteristics of the area. The text has been revised on PRLAs NM 6801 and NM11916.

* * *

10.4 (309) This page contains the discussion of impacts on WSAs from the No Action Alternative. The discussion includes aural and visual impacts on Ah-Shi-Sle-Pah WSA. The BLM completely fails to mention that virtually all of Ah-Shi-Sle-Pah is covered by PRLAs, and all of them are expected to be mined...The discussion also fails to mention the PRLAs bordering and overlapping the De-Na-Zin WSA, or the fact that a road (C-15) borders the De-Na-Zin WSA and will have greatly increased traffic from the No Action Alternative. (p. 3-14).

The text has been revised.

* * *

10.5 (311) The description of wilderness values consists of one paragraph, which notes the existence of four Wilderness Study Areas in the region and refers the reader to the Draft Proposed Wilderness Study Areas EIS for further information about three of the areas. This treatment of the subject results in a total failure by the EIS to provide for the record any sense of the tremendously important wilderness values of these areas. It is therefore inadequate...In the case of the three Wilderness Study Areas (WSAs) described in the Wilderness EIS, the Regional Coal EIS must contain at least a summary of the information found in the referenced document. 40 C.F.R.§ 1502.21 (1982). This summary should, at a minimum, specify the acreage involved, discuss which PRLAs lie in which wilderness areas, and provide an informative discussion of the attributes of those areas that make up their wilderness values.

Section 1502.21 of the CEQ regulations states that "No material may be incorporated by reference unless it is reasonably available for inspection by potentially interested persons within the time allowed for comment." EISs concerning the proposed actions for wilderness designation and coal leasing and development were prepared concurrently and released at the same time for public review. The WSAs in the San Juan Basin do indeed contain important values, more so than could be adequately summarized in a cursory description in the coal EIS. The description of the wilderness values and impacts are briefly described, as required by the CEQ regulations, therefore, the reader is referenced to the wilderness EIS for additional information on the WSAs.

* * *

10.6 (311) ...the EIS does not even bother to describe the fourth Wilderness Study Area, (Ignacio Chavez) despite the fact that it is not described in the referenced Wilderness EIS...Since this area is not included in the Wilderness EIS, the BLM has a clear obligation to describe it in Regional Coal EIS.

The text has been revised.

* * *

10.7 (311) ...the EIS's approach to the wilderness issue is that it completely ignores the wilderness values of the portions of the region not officially designated as WSAs. In particular, there is no discussion of the portion of the Bisti and De-na-zin Area of Critical Environmental Concern (ACEC) that is not included in the WSAs. Since the area surrounding the actual WSAs also has wilderness-related value, this fact should be acknowledged in the EIS.

For an area to be considered a "wilderness" resource as defined in the Wilderness Act, it must meet certain criteria i.e. size, naturalness, and outstanding opportunities for solitude and/or primitive and unconfined types of recreation. The only areas in the region found to posses these characteristics are the WSAs. The portion of the Bisti/De-na-zin ACEC that is not in the WSAs is not federally administered surface, therefore, we cannot recommend it for wilderness designation. Coal development would have adverse affects on these areas.

* * *

10.8 (311) In order to determine what mitigation measures should be included in the lease stipulations for the PRLAs within and adjacent to the WSAs, the EIS must contain detailed information about the likely impacts of their development. For example, what would be the frequency, timing and duration of blasting on these sites? How much of the WSAs would be affected? Would the mining activity be visible and/or audible from everywhere within the WSAs or just from certain points within them? If the latter, which points? Would the activity be visible from a particularly attractive part of the WSA or rather from areas that are unlikely to be used by wilderness enthusiasts?

Blasting information of this type is too remote and speculative to accurately ascertain at this time and is not needed to make a reasoned decision on the alternatives. It is clear that blasting on nearby mines will affect the WSAs. It is assumed that blasting could be visible from the WSA, but generally the activity is not frequent enough for continued disturbance.

10.8 (cont.) The degree is unknown. Also, see the response to comment 2.1 of the Topography/ Mineral Resources section.

* * *

10.9 (311) ...the EIS completely ignores the impacts to the Ignazio area.

Impacts to the Ignacio Chaves area are addressed in the Visual, Wilderness, and Recreation sections on page 3-48.

* * *

10.10 (356) The discussion should note that the Bisti and De-Na-Zin WSA's are included in the overall Bisti/De-Na-Zin ACEC that encompasses nearly 34,000 acres.

An ACEC designation is a completely separate and distinct designation from wilderness or WSA designations. An ACEC is designated for the purpose of managing scenic, wildlife, cultural, historic, and other resource values. There are no laws which provide protection for areas under this status. A WSA or wilderness designation is for the purpose of protecting wilderness characteristics and values of size, naturalness, opportunities for solitude, etc. Specific protection for WSAs and wilderness areas is provided by federal law.

* * *

10.11 (335) Subsidence could destroy unique geological structures and paleontological and archaeological sites that the De-na-zin Wilderness would be established to protect.

The actual final showings that went to the companies stated "The area (De-na-zin) is suitable for underground coal mining with no surface occupancy or subsidence." This was inadvertently left out of Appendix A-6 in the Draft EIS. The text has been revised.

* * *

RECREATION

11.1 (7) The Zone of Concern boundary shown on map 2-4 and referred to at page 2-33 is too narrow to accomodate such a travelway. The Zone boundary should be shown 50 miles from the Continental Divide in order to be consistent with current Forest Service policy. ...You should then take note of the boundary as so revised and indicate that the breadth of the Zone of Concern allows considerations of alternative CDT routes which will not be significantly affected by the proposed action.

The text has been revised.

* * *

11.2 (166) The overall importance of the Region as a recreational resource for primitive, unconfined, and dispersed recreation, and for appreciation of natural history, should be given more weight.

This document is primarily concerned with the potential for coal development in the basin and its effect on various resources. Although dispersed recreation will be affected, the direct and indirect impact from coal mining in any one year upon the region will be relatively small. The San Juan Basin Cumulative Overview and the Bisti, De-na-zin, Ah-shi-sle-pah Wilderness EIS do give more emphasis to primitive and dispersed recreation.

* * *

11.3 (290) Mitigation and enhancement of wildlife habitats should be considered to offset direct impacts of mining, provide additional fishing and hunting opportunities, and satisfy projected recreation demands.

There is a small amount of hunting that would be directly affected by coal development in any one year. Reclamation practices plus the mitigation measures aleady listed should allow for the reestablishment of the previous habitat required for hunting. Reclamation requirements require the area be reclaimed as much as possible to its original condition prior to mining. Reclamation procedures to provide additional habitat for hunting will not be required of a lessee, however, additional hunting opportunities may result after reclamation has been completed.

* * *

11.4 (321) The use of the word "would" implies that impacts will occur to the Continental Divide National Scenic Trail (CDNST). Since the CDNST is problematical at best, and since the Fernandez Company Ltd. is on record opposing any portion of the CDNST

11.4 (cont.) within the Lee Ranch, "would" should be replaced with "could." Refer to comment 470.10 above. (Visual Resources, p. 1-35).

This section of Chapter 1 is a summary of impacts by resource component. Since specific impacts by tract are not included in this section, the statement that impacts would occur to portions of the CDNST corridor is correct.

* * *

11.5 (321) The discussion of the Continental Divide National Scenic Trail (CDNST) fails to account for the fact that these tracts are on private land. Inasmuch as the Forest Service does not have condemnation authority for this trail, and the fact that the surface owner has officially notified the Forest Service of his opposition to having CDNST cross his property, the "impact" suggested here is totally without a basis in fact. Also make this correction to the discussion of recreation on pages 3-15, 3-43, and 3-48, and A-13-15, A-18. (Recreation, p. 3-38).

The Continental Divide National Scenic Trail was designated by Congress. We are, therefore, required to assess the potential impacts to the corridor that has been established. Although the Forest Service does not have condemnation authority, the BLM (the Department of the Interior agency involved in the development of this trail) does have this authority.

There are problems with the corridor location in northwest New Mexico. As a result, the BLM has submitted a proposal to the Forest Service that the corridor be located several miles east of its present location. The proposed corridor change would avoid the coal leasing area altogether. Until a final determination is made on this proposal, impact analysis conducted on its present location must remain in the coal EIS. The proposed changes to the CDNST corridor location have been added to the text.

* * *

11.6 (336) In the Recreation section, there is no reference to Chaco Culture National Historical Park. Figures on park visitation, the fact that it has been changed from a national monument to a national historical park, and the types of recreation experiences sought and available at Chaco Culture National Historical Park obviously belong in this section. It is a major recreational attraction in the San Juan Basin and should be discussed. (page 2-30).

The text has been revised.

* * *

RECREATION

11.7 (336) There are no mitigating measures which address visitors to Chaco Culture National Historical Park, such as limitations on coal hauling on routes used by visitors. (page 3-52).

The BLM does not have any authority to regulate traffic on public roads. It is assumed that the Star Lake railroad will be the primary means of transporting coal and that truck traffic will be limited to traffic between mines and railroad load out facilities. Significant transportation impacts are not expected to occur in the National Park area and are not discussed. Mitigating measures are, therefore, not included in the EIS.

* * *

11.8 (356) The DEIS analysis does not contain sufficient information to quatify these issues on these tracts.

The purpose of the DEIS is not to inventory or quantify recreation or scenic values. The EIS is written to identify and analyze impacts that could occur to resource components from the developent of leases issued for federal coal. The inventory and quantification of recreation and scenic values has been done through the Bureau's Chaco/San Juan Management Framework Plan (MFP) update for coal. Several opportunities were provided for public comment on the MFP.

* * *

12.1 (9) ...we suggested you consider in your report that the Animas-La Plata Project has irrigated land in the La Plata, New Mexico, coal lease area. ...we find no mention of this fact, nor do you mention having consulted our agency. We feel that it is important to consider that your action could affect approximately 600 acres of land associated with the Animas-La Plata Project.

The Animas-La Plata Project has been considered and analysis indicates that there will not be significant impacts since La Plata tracts number 2 and 4 are designated as underground mineable tracts. A proposed mitigating measure, in which a lessee would be required to locate surface facilities away from the irrigation project, has been included for further consideration as a lease stipulation.

* * *

12.2 (32) Numerous roads would be closed or relocated, causing inconveniences and possibly extra expense to the public. Who pays for the relocations costs?

All existing right-of-way permits establish a previous existing right which ensures and protects the structure and investment from other actions proposed on those public lands. Therefore, any or all portions of roads relocated will occur only after an agreement has been reached between the right-of-way holder and the coal lessee on the location and costs of relocation of any segment (see page 3-52). Because of the private venture of the coal development, public funds are not projected to be allocated for such costs.

* * *

12.3 (27) The Navajo Land Claim suit is not mentioned. The fact that almost every Chapter which will be affected by the coal development...has voted, sometimes more than once, unanimously, to reject plans for such development is not accounted for.

The text has been revised to include the Navajo Tribe's claim to 1.9 million acres in the San Juan Basin in the Interrelationships With Other Projects In The Region--Navajo Litigation Section of Chapter 1. The statement is made on page 4-5 of the DEIS that seven chapters have also expressed opposition, including Little Water, Nageezi, Huerfano, Torreon, Lake Valley, Ojo Encino and Pueblo Pintado....

* * *

12.4 (169) Also inadequately addressed were the impacts associated with traffic generated on New Mexico 44 and other roads across our

12.4 (cont.) lands as the increased population generated by the proposed developments travels from the Farmington area to Albuquerque and to such recreation sites as Heron and El Vado lakes. The draft documents...discussed traffic generation along Highway 44 from Nageezi northward and from Cuba southward, but did not cover the intervening stretch. That portion of the road crosses our land and will also have to handle an increased traffic flow as people and goods move between Albuquerque and the Four Corners area. Highway 64 across our Reservation will also be faced with an additional traffic burden as it is the most direct route from Farmington to such recreation areas as Chama and Heron Lake.

As is noted on page 3-4 of the DEIS, our impact analysis is concerned primarily with commuting workers who are projected to travel segments of NM 44 from Farmington, Aztec, Bloomfield, and Cuba to mine locations. That segment of NM 44 to NM 197 is considered as the primary route of workers commuting between Cuba and the proposed competitive coal lease tracts located in the southeastern portion of the coal region. The segment of NM 44 from the tri-cities area south to NM 57 is considered as the primary route of workers commuting to PRLAs and competitive coal lease tracts located in the central portion of the coal region. Therefore, as you noted the primary use of that segment of NM 44 between Nageezi and Cuba (NM 57 and NM 197) is limited to traval to and from the tri-cities and Albuquerque for goods and service. We have no way of determining the frequency and number of trips between the tri-cities area and Albuquerque to transport goods and services. Work is currently proceeding to upgrade a segment of NM 44 between Nageezi to Cuba which should accomodate any increased traffic due to any development of the actions proposed in the San Juan Basin.

Numerous lakes are readily available in the tri-cities area and southern Colorado such as Navajo, Vallaceto, and Lemon Lakes. These lakes are located in a closer proximity (1/3 to 1/2 the distance) to the tri-cities area, which is projected to have the major population influx. Upon considering these lakes, which offer essentially the same recreational oportunities, it was determined that significant impacts would not occur to NM 64.

* * *

12.5 (289) ...the land uses of grazing, farming water use for stock, water use for domestic purposes,...are ignored. These are the most common land uses on the tracts and should be addressed in this section.

The Land Uses section of the DEIS addresses only impacts and mitigating measures for land uses not analyzed under other re-

12.5 (cont.) source components. These uses are primarily the issuance of permits for roads, railroads, powerlines, pipelines, telephone lines, etc. This section does not address impacts and mitigating measures for uses covered under the appropriate resource sections of Chapters 2 and 3. Livestock grazing and associated water developments such as wells, reservoirs, etc are addressed in the Livestock Grazing section. No major agricultural (farm) developments are within the coal tracts. Domestic water use is discussed under the Water Resources (ground water) section.

* * *

TRANSPORTATION

13.1 (304) (311) The EIS states that one of the two transportation assumptions utilized in the analysis is that the Star Lake Railroad will be constructed and operating by 1987. (page 3-4). However, the recent decision of the Court of Appeals in the Star Lake case makes the construction of the railroad highly questionnable. Construction of an alternative rail line by either the state of New Mexico or the Navajo Tribe is also quite uncertain at present. The EIS analysis must be corrected to account for the likely absence of rail transportation facilities.

Impact identification and analysis required the assumption that the Star Lake railroad be built and available to transport coal mined in the San Juan River Region. The volume of coal projected to be developed, distance to transport coal, and present road conditions do not allow for coal to be transported economically for any alternative other than by rail facilities. Therefore, the issue is not which entity constructs the railroad, but that it will be available to transport coal when development begins in the Basin. The likelihood and timing of any railroad is a factor to be considered in the decision to lease federal coal.

* * *

13.2 (309) The Star Lake Railroad is assumed available by 1987. This appears to contradict the assumption underlying Figure 1-1 that only 682 million tons of PRLA coal will ever be produced. (p. 3-2).

Figure 1-1 presents projected amounts of coal to be mined in four separate years of coal development. Total amounts of coal mined by alternative can not be computed from this table. Therefore, there is no contradiction on the assumed availability of the Star Lake railroad and the total amount of coal projected to be mined in the PRLA alternative.

* * *

13.3 (309) Under the No Action alternative, no increased traffic impacts are shown in Colorado. This contradicts the assumption made elsewhere by the BLM that Colorado mines will produce 2.4 million tons/year if the lease sale does not occur. (p. 3-17).

The area for which impact analysis was conducted is northwest New Mexico. There are no statements in the EIS on coal production from Colorado.

* * *

13.4 (328) ...under the subheading Rail Lines, second paragraph, the statement is made that coal haul trucks will be used to haul

13.4 (cont.) coal from the mine properties to the Star Lake Railroad. In many instances rail spurs may be constructed to the mine properties, or conveyor belts may be used to transport coal from the mine property to a rail-load-out facility. These two other alternatives should be identified and considered. (p. 2-37).

The text has been revised.

* * *

13.5 (328) In view of the past year's developments concerning the Star Lake Railroad, its construction should be considered in the EIS in stages. (p. 3-4).

See the response to comment 16.8 in the General Comments section.

* * *

13.6 (328) ...reference is made to coal being trucked from the Black Diamond Mine to power plants near Farmington. As of this date there has been no coal mined at the Black Diamond Mine. Only humate has been extracted from that property. In addition, coal which was moved from this area would quite likely use the transportation corridor which is now being permitted by the Bureau of Surface Mining, Mining and Minerals Division for use by San Juan Coal Company. This, as currently planned, would be a road capable of handling off-road coal haulage trucks. (p. 3-34, second paragraph).

The text has been revised.

* * *

13.7 (328) ...reference is made that lease holders would share cost with the State of New Mexico for major road way improvement, and that cost would be paid in propertion to tonnages hauled by truck. There are no State statutes at the present which would enable this mitigating measure to take place. (page 3-53, first paragraph).

The text has been revised.

* * *

13.8 (336) Analysis of the possible effects of increased traffic on visitors bound for Chaco Culture National Historical Park should be included. (page 3-15).

NM 57 is the primary access to the Chaco Culture National Historical Park. Increased traffic for NM 57 is shown on Table

13.8 (cont.) 3-8, page 3-17. Significant increases are not projected above the No Action alternative level. See the response to comment 11.6 in the Recreation section.

* * *

13.9 (349) Mitigation measures need to be addressed regarding the impact of increased traffic on rural road systems and on residents and livestock in the local lease areas.

The text has been revised.

* * *

14.1 (27) (44) (76) (100) (300) (524) How many jobs will result from this development? Who will get those jobs? Why is Navajo preference not a requirement for lease development,....?

The numbers of jobs and their general distribution are listed in Table 3-10. Local residents will have an opportunity to apply for jobs regardless of ethnic origin. The BLM does not have clear authority to specify or require that a preference be given to Navajos in hiring them for jobs that would become available through the development of coal leases, but a proposed mitigating measure has been drafted to allow for the consideration of this point in the development of stipulations.

* * *

14.2 (44) (76) (100) (289) (330) (332) (349) The EIS should include employment figures for local Navajos (people living near the tracts, not in Farmington or Cuba). The EIS should also estimate different levels of Navajo employment with and without Navajo preference. The EIS should address the issue of population increases in rural areas near the leases outside of Farmington and Cuba. Further, Gallup should be included in assessments of all alternatives. (page 1-26).

Employment of Navajos would result in people acquiring jobs at possibly higher levels of pay, however, employment with or without hiring preference would not mitigate impacts projected to occur under the American Indian section of the EIS. Additionally, the employment factor was based only on the available current data for all groups and locations throughout the region. Localized data on Navajo employment figures and skills are not available from Chapters or other sources in the region. The areas where employment impacts were projected to occur at significant levels are discussed in Chapter 3. See the response to comment 15.1 (10) in the American Indian Concerns section.

Population impacts are projected to be significant in the tri-city area (Aztec, Bloomfield, and Farmington) and Cuba. While impacts would occur in rural areas, they were not considered to be significant and were, therefore, not included within the EIS. Gallup was considered in the impact analysis conducted for each alternative. Significant impacts were not identified.

* * *

14.3 (100) Other concerns not addressed...include the impacts of relocation and population influx on law enforcement; the availability of suitability of medical and educational facilities; and shifts from rural to urban orientation among families. It is anticipated that: (1) relocation would take place as needed to facilitate mining, (2) families would be moved together,

14.3 (cont.) and (3) families would be moved no farther than is necessary to avoid the impacts of mining. This would tend to minimize the cultural and social impacts of relocation. It is not anticipated that there would be a rural to urban shift. Families would not be relocated to urban areas unless such a request is made by a family. Medical and educational facilities should not be any less accessible than they are at present, particularly for rural Indian residents. Law enforcement problems could increase, but the amount of increase can not be determined at this time. Additional law enforcement personnel may be needed.

* * *

14.4 (100) (133) We believe that the anticipated influx of a great number of construction workers and their families may result in a substantial increase in demands for housing, consumer goods, health and educational facilities, police and fire protection, and social services. In addition, the rapid rise in population and industrialization of the area could have a significant impact on the interrelationships between individuals of differing cultural or ethnic origins and lifestyles. While the EIS identifies some of these potential problems, there is no indication that steps are underway to enable communities to respond to them.

Cyclic periods of development are experienced in Aztec, Farmington, Bloomfield, and Gallup. Current minerals production in these areas has dropped off. Because of current conditions, these communities should have most of the facilities and services needed to handle an influx of people associatd with coal development. Differences between individuals of differing cultural or ethnic origins and lifestyles already exist in the area. An increase of such problems might be expected to occur, but the degree of significance can not be determined at this time.

While little funding is available for energy impacted areas such as Cuba, communities are currently considering and planning for the best use of their resources in the way they feel will be most effective.

* * *

14.5 (289) (349) Population figures are available for rural areas by chapter and should be given here as well as in the Native American concerns section. (page 2-35, demography).

14.5 (cont.) Population figures were listed by Navajo Chapter in Table 2-18 of the DEIS. This table has been referred to in the demography section of Chapter 2 of the FEIS.

* * *

14.6 (289) (349) The EIS should quantify income sources. Data are available for 1974 (Brigham Young University Small Business Feasibility Study, on file with the Navajo Tribe) and from the 1980 census. What percentage of families' income derives from wages, public assistance, retirement, livestock (wool and livestock sales), rugs, jewelry, other handicrafts, etc.? What is the level of occupational skills in the population that could qualify then for jobs in the mines? (page 2-42, American Indian Concerns).

Data available from a 1974 study is not considered to be current and income sources are not available from the presently published 1980 census. Information of this type (income sources and occupational skills) is not expected to be of use in the identification and analysis of significant economic impacts on a regional basis. The type and level of detail requested for income sources and occupational skills may be considered by the lessee at mine plan stage when negotiating with qualified surface owners or in hiring miners during mine development.

* * *

14.7 (289) (330) (356) Employment section should estimate as closely as possible the proportion of surface mine jobs that would go to residents of the region--not merely assume that the proportion would be 50%. If 50% is a rational estimate, the empirical basis for the figure should be specified.

Data is not available to estimate the number of people who could qualify for mining jobs. The fifty percent figure was based on figures reported in the "Construction Workers Profile" which indicates that the average local hire in 14 projects studied was 39.9 percent. Since preparation of the PRLA EA, consideration of local unemployment rates resulted in an adjustment to 50 percent.

* * *

14.8 (289) These sections need to include impacts on rural areas--the Navajo Chapters where the mines are located (Infrastructure and demography).

See the response to comment 14.4 of this section.

* * *

14.9 (289) The whole issue of relocation is drastically minimized. The economic cost is not considered (lost income and property) (American Indian Concerns).

Since the lessee would be required to negotiate settlements for property and income losses with surface owners consenting to mining on their property, the economic costs of relocation were not considered. Those who do not give consent would not be relocated, under most circumstances.

* * *

14.10 (294) ...An economic analysis of...coal development should include average wage for workers, estimated total payroll figures by year, the number of indirect jobs created, and the present area and state unemployment rates.

The economic analysis was based on the number of jobs created in mining a million tons of coal. Employment multipliers of 1.8 and .65 were used to determine the indirect employment associated with mining and construction development respectively. 1981 unemployment rates of 9.3, 7.4, and 7.3 percent (McKinley and San Juan counties and the State of New Mexico) were used for impact analysis conducted in 1982. Average wage and payroll figures were not calculated since personal income was not analyzed. Information of this type (wage and payroll figures) is not expected to be of use in the identification and analysis of significant economic impacts on a regional basis.

* * *

14.11 (294) Estimated taxes from development in the San Juan Basin should include estimates of federal royalties plus state royalties, severance taxes, income taxes, excise taxes, sales taxes, etc.

The royalty figures calculated for the EIS are federal royalty figures. Half of the federal royalty is returned to the State. Severance tax received by the State may or may not by returned to the local economy in the San Juan Basin. (See Table 3--13 for projected severance tax revenues.) Sales taxes on coal are really a gross receipts tax which is 5 percent of the receipts received from out-of-state sales. Due to the limited amount of income generated by the excise and sales taxes, it was not calculated or considered for impact analysis.

* * *

14.12 (294) Notation should be made of New Mexico's per capita income, its major source of tax revenue, the percentage of land owned by government entities, and its five major sources of employment.

14.12 (cont.) Information of this type (per capita income, percentage of land owned by government entities and the five major sources of employment) is not expected to be of use in the identification and analysis of significant economic impacts on a regional basis. Major tax revenues have been addressed in the EIS.

* * *

14.13 (64) (294) ...no attempt is made to address the specific concerns of other Native Americans, Hispanic-Americans, or Anglos. What are the positive or negative effects of the projects proposed in the... (DEIS) on these groups? What is the population percentage of these groups in the San Juan Basin? What are the other groups concerns and needs?

Significant impacts were projected to occur only to Navajos living on or adjacent to the areas proposed for coal mining. Impact analysis narrative is, therefore, limited to discussing impacts to Navajos. The ethnic population mix is presented in Table 2-13.

* * *

14.14 (309) The EIS should admit that any mining on newly leased tracts will only come at the expense of mining that would otherwise have occurred elsewhere. It should discuss the job and tax losses caused by shifting production to new leases from existing ones. It should compare the socioeconomic impacts of expanding production at existing mines or leases versus issuing brand new leases for tracts largely lacking transportation or any other infrastructure.

The statement that mining of newly leased tracts would occur at the expense of mining that would occur elsewhere. We don't believe that this will occur. The BLM does not have information that supports such a statement. It is assumed that current and projected mines under permit or contract commitments would remain in production to honor legal obligations. Any expansion of existing mines would be at the discretion of the company holding the lease and the need to meet contract commitments. New production would be based on market conditions and contract agreements and not to the detriment of existing and permitted operations. The text will remain as written.

* * *

14.15 (309) Under the No Action alternative, no increased accident or employment impacts are shown in Colorado. (page 3-19).

14.15 (cont.) See the response to comment 13.3 in the Transportation section.

* * *

14.16 (309) Table 3-13 shows severance and property tax increases. This table assumes that increased leasing leads to increased production and hence increased tax revenues, an incorrect assumption. (page 3-22).

All assumptions used in the development of the analysis contained in the EIS are listed in the front of Chapter 3. Assumptions were not utilized in developing Table 3-13. This table was developed to present projected tax revenues that could occur if mining were to occur at any of the alternative levels presented in this table.

* * *

14.17 (309) Table 3-17 shows Navajo Indian employment increasing with higher leasing. This table assumes that increased leasing leads to increased production, which is false...It assumes Navajos will get over 35% of all new jobs in the No Action Alternative, and over 47% of all new jobs in the Target Alternative (cf. page 3-19). These are exceedingly high values which have no documentation. (page 3-24).

See the response to 14.16 of this section on the development of tables. The text has been revised on Navajo employment figures.

* * *

14.18 (309) The BLM implicitly assumes that coal prices do not change in real terms, so that the value of coal mined in 2010 is the same as the value of coal mined in 1990. This simplifies the calculation of royalty numbers, but is misleading. A million dollar royalty payment in 2010 is not the same as a million dollar payment in 1990, even if there were no inflation at all simply because one must wait 20 years to get it. The BLM should explicitly state its inflation assumptions, state what year's dollars it is using, and discount all revenues back to current (1983) dollars. Not doing so immensely overstates the net present value of leasing.

There are no inflation assumptions. The BLM is aware that there are a number of variables which make it impossible to project reasonable royalty rates over time. Royalty figures are presented merely to provide an approximate amount of royalties that could be generated from coal development.

14.18 (cont.) The preparation of the DEIS was during 1982, therefore, 1981 dollar figures were utilized in preparing the economic section. Recalculation of royalty rates using 1983 dollars would update the figures presented in the DEIS. However, royalty rates using 1983 dollars would not remain current. Because of this problem, the most current data available at the time the document was prepared was utilized with the knowledge that the actual numbers will be greater or less from what was projected at the time the document was prepared. The text will remain as written.

* * *

14.19 (310) (332) Since "costs generated by population growth often exceed the revenues in the first few years of development" (p. 1-21), does BLM plan to seek prepayment of royalties or in any other way make financial provisions to mitigate socio-economic impacts.

Current lease forms do not require prepayment of royalties or require that the money paid on leases be utilized for impact mitigation. The Regional Coal Team (RCT) is considering raising the rentals on PRLAs. The Bureau is also encouraging the State of New Mexico to utilize the additional funds (if approved) for impact mitigation.

* * *

14.20 (321) What is a "semi-industrial setting?" What would this mean in terms of income levels, jobs, and increased social and cultural opportunities?

The text has been revised.

* * *

14.21 (321) Item 3 (severance tax) should indicate an effective 1982 New Mexico severance tax of 91.7 cents/ton, which rises annually as a direct function of the Consumer Price Index Deflator published by the U. S. Department of Commerce. (Assumptions - Social and Economic Factors, p. 3-4).

The severance tax used for impact identification and analysis was the current rate available at the time the EIS was prepared. It has been noted in the text that the rate changes from year to year.

* * *

14.22 (68) (321) The statement concerning increased capital and operating expenditure requirements of local counties, school districts, and municipalities is too broad. Many communities, such as Grants,

14.22 (cont.) (328) (349) already have under-utilized capacity and could easily accomodate increased population growth. (No Action Alternative, p. 3-54).

As was noted in the EIS, there were shortages in capital improvements at the time the analysis was prepared. The development and completion of capital improvements plus a slowdown in energy development in the year since the original analysis was prepared has resulted in a surplus of capital improvements for some communities. See the response to comment 14.18 in this section on the use of current data for impact analysis.

* * *

14.23 (330) No analysis could be found of fiscal impacts to the state beyond tax revenues. Losses to the state in leasing revenues resulting from coal sales during a soft market should be addressed...State expenditures on roads, hospitals, social services, and other welfare and infrastructure needs arising from coal development are not mentioned.

Royalties and severence taxes are major sources of revenues that will accrue to the State as a result of mining coal and this will come about as a result of the proposed leasing action. The leasing revenues themselves, including the annual rental and the bonus bid, may be reduced some but their contribution to the total State receipts are not considered significant (in this case probably less than one percent). It is assumed that State expenditures would show a close correlation with population increases. Population increases were not projected to increase to significant impact levels. Therefore, it is assumed that significant amounts of State funds, for community services, facilities, etc. would not be required.

* * *

14.24 (330) (332) There is no discussion...of impacts on mental and physical health associated with energy development;...Increase in interracial conflicts resulting from energy development is not addressed in this DEIS.

The rate of mental and physical health problems and interracial conflits are projected to increase proportionately to population increases. Population increases were not projected to increase to significant levels. The projected rate of increase should be at a level below the capacity of most community facilities. The only exception may be the community facilities for Cuba, for which there is a potential for very rapid growth.

* * *

14.25 (68) The EIS does not explain why no population growth is expected in Crownpoint except under the High Alternative. Table 3-16. This is unrealistic given Crownpoint's proximity to many lease tracts.

Crownpoint, primarily developed by the Bureau of Indian Affairs, was developed for the administration of the Eastern Navajo Agency. Federal policies affect community policies and procedures. Workers not associated with federal employment or Indian lifestyles usually prefer to live in communities where they can provide a higher level of input and participation in community affairs. It is anticipated that many of the workers and their families would settle in other communities. Therefore, a significant population increase is not projected for Crownpoint.

* * *

14.26 (68) The EIS refers to "other problems" with a sharp population rise, but does not describe them, nor discuss relevant data on boom town phenomena. (p. 1-36).

Impacts resulting from significant population increases are discussed in Chapter 3. Pages 1-23 through 1-36 of Chapter 1 are general summaries of impacts by resource component.

* * *

14.27 (68) Employment is a function of production, which is a function of need. Employment estimates must be reduced to reflect lower, more realistic need estimates.

The environmental analysis process begins with the need being identified for some type of action, which could affect the human environment. This need and public input provide the basis for developing a set of alternative actions, which will meet all or a part of the need. Impact analysis determines the consequences to the human environment of each of the alternatives. The employment estimates given reflect the employment impacts resulting from the alternatives selected for analysis. If employment estimates were to change, it would be based on a change in alternatives.

* * *

14.28 (68) The PRLA Environmental Assessment and EIS (p. 3-18) disagree on the per cent of "local hires". What data and methodology differences caused this disagreement?

14.28 (cont.) See the response to comment 14.7 in this section.

* * *

14.29 (68) Employment estimates fail to distinguish between direct and indirect gains. (e.g. p. 3-18).

See the response to comment 14.10 in this section.

* * *

14.30 (68) Relocation costs will affect demand for and sale price of tracts and should be estimated in the EIS.

The number of qualified surface owners that consent to mining on their land and relocation will not be finalized until just just prior to the competitive coal lease sale scheduled for December 1983. Specific relocation costs will not be developed until specific mining operations are developed and submitted in a mine plan for each leased tract. Therefore, this information will not be available until environmental analysis are prepared on the mine plan.

* * *

14.31 (68) The EIS lacks meaningful discussion of impacts on urban quality and the built environment. 40 C.F.R. 1502.16(g). Impacts on land-use patterns, traffic flow, aesthetic quality and other urban concerns should be evaluated.

The amount of discussion given to any aspect of a resource is determined by the identification of significant impacts to the resource, particularly impacts that can not be mitigated. This approach, as required in section 1502.2 (b) of the CEQ regulations, may seem to overlook certain areas or aspects, which is not the case. Significant unmitigated or partially mitigated impacts are presented in the resource component to which they apply.

* * *

14.32 (332) No methodology or references are cited for population projections or for the public revenue and expenditure figures given in this section. (p. 3-18 to 3-25, Tables 3-10 to 3-16).

Direct employment figures of 103 and 326 employees per million tons of coal mined were used to compute the number of employees for surface and underground mines respectively. Indirect employment was calculated using employment multipliers of 1.8 and .65 for mining and construction employment respectively. A figure of 1.26 employed persons per family was used to calcu-

14.32 (cont.) late the number of new families projected to come to the area. A Figure of 2.8 persons per family was used to calculate the projected total new population.

* * *

14.33 (332) It is important that a more explicit analysis of costs and benefits be made...emphasizing the recipients of each, as well as required mitigation measures. More importantly, the question needs to be raised as to whether the benefits generated for the very few as a result of these projects, really warrant the long-term costs which will be borne by a much greater number of people, including many segments of the population who can least afford them.

See the response to comment 16.35 in the General Comments section.

* * *

14.34 (332) (1) The timing of development...How this is to occur, and assurance that it will in fact occur as planned need to be stated in the EIS.

The amount of development that may realistically occur may not coincide with the alternate levels analyzed in the EIS. It is expected that market conditions will determine when, where and to what extent coal is developed in the San Juan Basin. Because of a number of variables that influence market conditions, statements on planned development have not been included in the EIS.

* * *

14.35 (333) In the sections on Short and Long Term Productivity, too much weight is given to long-term beneficial impacts of increased labor force, infrastructure improvements, considering the highly fluctuating nature of the coal and minerals industries. The consequences of catapulting a community from a stable, small scale level into the throes of a boom-bust economy, need much more careful consideration than is given in the DEIS.

Until last year, communities in the San Juan Basin (except Cuba) have been experiencing a "boom" condition. Coal development would replace the current slowdown in the uranium and oil and gas industries in the region and offset the "bust" portion of the cycle.

* * *

14.36 (349) Housing data and availability in the Navajo communities and chapters are not addressed, this should include numbers and

14.36 (cont.) types. What is the impact on current residences from influx of workers? (page 2-40).

Housing data by Navajo Chapter is not available. Significant housing impacts are not projected to occur. Lease stipulations require houses destroyed from surface mining be replaced after reclamation is determined to be completed. No significant impacts are known to occur from the influx of workers into the area.

* * *

14.37 (356) The DEIS does not address the concerns of local Native Americans who do not have access to the traditional sheep herding/subsistence way of maintaining themselves and who must leave the area for wage work in remote locales in order to make a living.

See the response to comment 15.1 (3) in the American Indian Concerns section.

* * *

15.1 (25) (44) (45) (61) (68) (100) (152) (214) (260) (289) (300) (303) (304) (309) (310) The document fails to address such key questions pertaining to relocation as:

(1) Where, specifically, will people be relocated?

Until leases are issued, mine plans submitted and approved, and permits issued for actual mine operations, we cannot accurately determine which specific family units or individuals will be required to relocate nor are we able to determine exactly where these individuals will be relocated. The relocation issue will need to be resolved with the individuals, the lessee and possibly Navajo Chapter officials, the Navajo Tribe and BIA. Additional statements concerning relocation issues are found in Appendix I-2.

* * *

(330) (335) (336) (349) (2) When are they envisioned to return?

As a general estimate, 20 to 40 years could elapse between the time an area is open to surface mining until grazing or occupancy could be resumed. Potentially some revegetated areas could be grazed or reoccupied at the end of the fifth growing season. However, this is solely dependent upon mine plan operation. The text has been revised to include a statement that families may reoccupy their traditional-use areas after reclamation efforts are determined to be successful.

* * *

(3) How will relocatees maintain their livestock, when there are no vacant grazing areas in the Navajo Chapters affected?

Provision number 5 in Appendix I-2, requires that "The new location would have sufficient water and forage to accomodate the occupants/users' displaced flocks or herds." This requirement would be included as a stipulation in the lease issued to the lessee and would be required in any agreement negotiated between the occupant/user and lessee.

The lessee will be solely responsible for acquiring the necessary forage or water for displaced flocks or herds whether it be through purchase, lease agreement, exchange or other legal means of acquisition.

* * *

(4) How are lost or impaired water sources to be replaced?

15.1 (cont.) All water sources lost or impaired are to be replaced in kind as required by SMCRA and state law.

* * *

(5) How will people be compensated for losses that cannot be replaced otherwise? Who will determine the dollar values involved? Who will resolve any disputes over the amounts involved? Who will bear the costs of all this?

Compensation and associated values will be negotiated between the lessee and the individual land owner or user on all items of preceived value (dollar or otherwise). It is assumed that the BIA, local Chapter officials, the Navajo Tribe and perhaps the BLM would or could assist in the resolution of problems associated with compensation. The lessee will be responsible for compensation if it is determined that compensation is legally and rightfully due. This is to be done on a case by case basis. If necessary, the courts may have to settle or resolve the disputes if agreement can not be made.

* * *

(6) What response will be made to people who state that they refuse to relocate? What rights of appeal do they have? To whom?

Coal leases and applicable laws and regulations will define the legal rights and duties of the coal lessees and those individuals living on land overlying leased coal. Disputes arising between these individuals and the coal lessees will be resolved through administrative appeal procedures and the courts.

* * *

(7) If families are to be relocated as a unit and not split up...how big will that unit be? What will be the impacts on extended family members left behind, and on people in areas to which relocatees move?

As is stated in the response to comment 1.1 under Social and Economic Factors, "It is anticipated that:...(2) families would be moved together, and (3) families would be moved no farther than is necessary to avoid the impacts of mining." Generally,

15.1 (cont.) there would be anticipated disruptions in the location of families within the kin group (page 3-25 of the DEIS). Traditional roles or responsibilities of those members that would be relocated would need to be assumed by the remaining members of the outfit. Increased responsibilities to some individuals could result in an increase in emotional problems. Some roles or responsibilities may not be assumed, which could result in problems for the outfit. The type and degree of impacts that would occur within a specific group would depend on the distance and the length of time a family or families are relocated from their traditional-use area and to the extent that the traditional Navajo lifestyle is maintained within the family. Impacts to families living in the resettlement areas prior to the relocation of families to that area would depend on the number of families and the length of time a family had occupied the area. The extent of these impacts can not be determined at this time and are, therefore, not included in the Regional Coal EIS. Analysis of these impacts would be required in a site specific environmental analysis on a mine plan developed by the lessee. The mine plan would indicate where, when, and the projected length of time a family or families would be relocated.

* * *

(8) What role will Navajo Chapter governments have in approving or disapproving relocation activities within their boundaries?

Chapter governments and the Navajo Tribe are expected to play a vital and active role in the determination of any relocation activities within affected Chapter boundaries. Legal or statutory constraints of each Chapter could also directly affect the relocation process. It is assumed approval or disapproval would be on a case by case basis before mining permits have been approved and issued.

* * *

(9) What Federal and Tribal laws and regulations govern relocation?

Other than established or implied legal rights associated with homesteads, grazing allotments, fee lands, patents, surface owner consent etc. we are not aware of any state, federal or Tribal laws governing any aspects of the relocation process as associated with proposed coal development.

* * *

(10) Policy of employment of Navajos and Navajo preference...

15.1 (cont.) Local residents will be provided an opportunity to apply for jobs regardless of ethnic origin. Beneficial economic impacts would occur to Navajos who have or can obtain the necessary job skills. The number of Navajos that possess these skills is not available and is, therefore, not documented in the EIS. The BLM's authority to specify or require that a preference be given to Navajos in hiring them or that training be made available to them for jobs that would become available through coal development is unclear. A mitigating measure requiring Navajo preference has been drafted and is discussed in the section on mitigating measures for possible adoption.

* * *

15.2 (44) (309) ...the employment shown appears to exceed that shown for the individual tracts even if all tracts are (incorrectly) assumed in simultaneous production (see pp. A-1 to A-45). (Minimum Conflict, Target, and High Alternatives).

The text has been revised.

* * *

15.3 (64) (111) (156) (304) (349) (355) The EIS should...discuss the potential disruptive effects of the Navajo Tribe's lawsuit to reclaim the area.

The text has been revised.

* * *

15.4 (96) (363) The EIS...did not adequately address potential impacts on Jicarilla, Ute and Zuni lands or to their resources.

A letter from the Jicarilla Tribe outlined areas of concern with the proposed coal leasing in the San Juan River Region. These concerns have been considered and their comments and responses are found in the appropriate resource section to which the comments apply.

Due to the location of the Jicarilla, Ute and Zuni reservations to the PRLAs and the proposed competitive coal lease tracts, we do not believe that there would be significant impacts to these lands, resources, or individuals.

* * *

15.5 (100) (303) Actual population figures must include the residents of all tracts, whether they have a legal basis for residency or not, and those people who use tracts or portions of tracts for grazing or some other purpose but who do not live within tract boundaries.

15.5 (cont.) Population figures in the EIS include legal landholders as well as unauthorized occupants. It is acknowledged that individuals who are not actually living within a PRLA or competitive coal lease tract boundary will be impacted by proposed coal development. These individuals are included in the population figures, if they reside within the San Juan Basin. The specific individuals who would be affected by coal development would be determined and analyzed in specific environmental documents prepared on mine plans submitted on specific tract(s) by the lessee.

* * *

15.6 (100) (289) (349) Households and dwellings are undercounted, at least in NM-8128. These families also have cornfields and dams, which are not counted among the improvements.

Current inventory of PRLA NM-8128 does not disclose any occupied dwellings. Abandoned or unutilized cornfields, dams nor other water control structures were inventoried for PRLA NM-8128. Inventory of physical structures or cultivated fields would be conducted and noted at the mine plan stage.

* * *

15.7 (100) (289) (349) The number of PRLA's with Navajo occupants counted is only a small portion of the total PRLA's and covers only perhaps 20-25% of the total PRLA acreage. Nearly all PRLA's listed with occupancy data are in McKinley and Sandoval counties, whereas only two PRLA's in San Juan County are tabulated. The missing PRLA's are NM-2457, 11670, 8129, 3919, 8745, 9764, 6804, 3755, 3837, 10931, 3836, 6803, 7235, 3754, 3752, 3753, 3835, 3838, 3834, 6802, 11916, 0186612, 0186613, and 0186615. There are Navajo occupants on these tracts.

All of the PRLAs were inventoried for residences during the spring and summer of 1981 and 1982. PRLAs that were not listed in Appendix F-1 did not have any residences located on them. NM-0186612, NM-0186613, and NM-0186615 are current federal leases and not preference right lease applications.

* * *

15.8 (100) (289) (349) Data are not tabulated for occupancy on the following competitive lease tracts: Bisti 4, Bisti 6-8, Kimbeto 2, Gallo Wash 1, Star Lake West 2, Bread Springs 2, Chaco Wash South, Lee Ranch (east, middle, and west), Hospah 1, Hospah 2. Navajos live on or use some, if not all, of these tracts.

Current inventory does not indicate any residences on these competitive lease tracts. The text will remain as written.

* * *

15.9 (100) (184) (204) (345) (347) (349) How will the Tribe's selection of 35,000 acres for resettlement of families from the Navajo-Hopi Joint Use Area affect relocation from these proposed activities?

It is unclear the extent to which the Navajo Tribe would use the selected lands if the selection was approved for relocation. Nearly 22,000 acres of the selected lands contain surface mineable coal and the Tribe may consider proceeding with development of those lands. It is also possible that Tribal ownership of those lands may ultimately ease relocation problems caused by coal mining simply because of Tribal presence in the area.

* * *

15.10 (100) What of the...affected residents who are non-English speaking? How will the emotional, psychological, financial and physical impacts be explained and mitigated for them.

Family members or interpreters from BIA or BLM would be available to speak to residents that can not speak English. Emotional and psychological impacts would need to be handled by family, friends, and medical facilities designed to deal with such problems. It is anticipated that financial and physical impacts would be considered in the negotiated agreements between the lessee and those families that would be relocated. Measures that would help to mitigate some of the physical impacts are listed in Appendix I-2. The text has been revised to include a more in depth analysis of these concerns.

* * *

15.11 (100) What is the effect of the general opposition among local Navajos to the proposed activities? Will there be effects on the various kinds of costs of relocation due to this opposition.

Opinions (for or against) regarding the proposed coal lease sale of federal coal are contained in a listing of the remarks and comments received on the Regional Coal EIS. These opinions are available for the Secretary of the Interior's review and consideration before a decision is made as to whether there will be a competitive coal lease sale in the San Juan River Region. The EIS also considers as an alternative an exchange of coal interest to protect Navajos residing in the area.

Impacts (costs) of relocation, insofar as they relate to the human environment, under NEPA, are addressed in this EIS.

* * *

15.12 (111) (299) (300) Response to the Navajo Tribe was inadequate. The Navajo Tribe has refused consent for surface mining (p. 4-5) and there was no response. Since Navajos constitute the majority of the population living in the EIS Region, we believe they should be responded to.

This request was denied by BLM. The BLM believes that neither the Navajo Nation as surface owner of trust or fee lands nor individual Navajos as grazing lessees of public lands can be a qualified surface owner as that term is defined in the Surface and Mining Control and Reclamation Act. In addition, even if the Navajo Nation or grazing lessees could be qualified surface owners, the BLM cannot accept tribal consent because the tribe did not specify the lands or the exact nature of the ownership interest involved. The tribe has not responded to the BLMs position.

* * *

15.13 (68) (205) (235) (289) (300) (303) (330) (349) There is also a lack of information and awareness about Indian graves and sacred places in the potentially affected areas.

The Bureau is very much aware of the fact that the number of sacred sites and gravesites is underestimated and is keenly aware of the Navajos reluctance to disclose the specific location of such sites to outsiders.

Failure to identify or provide information concerning gravesites by families to the lessee during the development of the mine plan could result in the complete or partial destruction of a gravesite during mining operations. Known gravesites will be afforded protection as provided by all applicable state and federal laws and regulations. State law requires pemission from the family before a gravesite can be disturbed. Should gravesites be physically relocated, the cost of such relocation and ceremonies would have to be negotiated between the next of kin and the lessee.

Sacred sites while identified are not to our knowledge afforded protection under 34 CFR 3461.1 (Unsuitability Criteria) or the Joint Resolution on American Indian Religious Freedom Act. Until such time as the Bureau is directed to do otherwise, sacred sites will be identified, but not declared unsuitable for surface mining. However, at least 180 days prior to conducting coal mining operations, the lessee is required to contact the Navajo Nation, the Medicine Mens Association, and the Navajo Chapter to provide an opportunity to conduct mitigatory actions for sacred and sensitive areas.

* * *

15.14 (289) The families on PRLA NM-8129 obtained the right to live there through a land exchange with a white rancher who leased the present PRLA tract. The exchange was reportedly negotiated with BLM involvement and is on record in Santa Fe, according to a member of one of the families. Yet these families were listed as unauthorized occupants in the BLM's 1974 occupancy census, which is presumably the basis for the data in Table F-1.

In an agreement consumated on August 18, 1950 between Ed Sargent (Frank Allotment), Willie Norberto, Francis Norberto and Hosteen Seco Torivio land was granted for the exclusive use as individual grazing allotments. The agreement did not grant, imply nor exchange land to be utilized for a permanent or temporary residence. Any occupied dwellings are, therefore, considered as unauthorized. The text will remain as written.

* * *

15.15 (289) The EIS should include an assessment of how many surface owners will refuse consent and what possible subsequent actions will result,...

A total number of qualified surface owners that will or will not refuse to give their consent to allow coal mining on their property can not be determined at this time and specified in the EIS. Mining companies have just before the lease sale to obtain consent from the surface owner. The response to comment 15.1 (6) of this section discusses the actions that would occur from a refusal to consent.

* * *

15.16 (68) (289) (335) BLM should provide a concrete and detailed examination of the relocation issue as Navajo relocation from coal mine leases and other large tracts has been going on for an entire generation and studies of the effects are available...The EIS should provide estimates of the value of losses of real property and foregone income. (page 1-21, American Indian Concerns).

The reference section of Chapter 1 is concerned with summarizing the major issues of public concern that were identified during the scoping process of this EIS. More information is provided on relocation in Chapters 2 and 3. The text will remain as written.

Discussions of prior Navajo relocations would be general in nature and are not expected to provide any additional material

15.16 (cont.) on the types of impacts expected to occur as a result of coal development. The text will remain as written.

* * *

15.17 (289) The DEIS contains no documentary evidence to support the statement on p. 2-42 that BLM has made initial contact with the Zuni Tribe to notify them of potential leasing in the area.

The Zuni Tribe was notified by letter in July 1982. A response from the Tribe in July 1982 is on file in the Farmington Resource Area Office.

* * *

15.18 (289) There is no evidence of any written contact, public meetings, or official transmittal of the DEIS to Navajo Chapter officials of Tsayatoh, Church Rock, Bread Springs, Red Rock, Chi-chi-tah or Becenti Chapters,...

It was never proposed by the Bureau, BIA or Navajo Chapter officials to conduct meetings at every Chapter House. Meetings were generally held when and where requested by either Chapter officials or the BIA. Numerous Chapter House meetings were held that were attended by individuals from other Chapters in Gallup, Farmington, Crownpoint and Albuquerque.

* * *

15.19 (294) What do the terms "American Indian lifestyles: and "values" mean...the terms are not clearly defined. Do they include the shortened life expectancy, the high percentage of alcoholism, the high unemployment rate, etc. among the Navajos or are the authors of the documents using the terms only in a positive context?

The terms "American Indian lifestyles" and "Values" are general expressions that include both traditional cultural patterns and those aspects of current Native American living conditions that may be viewed as problematic.

* * *

15.20 (300) Cultural significance of certain special wildlife species and special interest plants has also not been mentioned in the BLM documents.

15.20 (cont.) A stipulation has been recommended to include plants of cultural significance in reclamation seed mixtures in traditional gathering areas.

* * *

15.21 (328) (300) ...the entire paragraph is not clear and needs to be rewritten and expanded. (page 1-22, third paragraph, Hopi-Navajo Relocation).

The text has been revised.

* * *

15.22 (330) Seven Navajo chapters...have passed...resolutions against coal strip mining,...Copies of these resolutions should have been attached to the DEIS,...

Seven Navajo Chapters (Little Water, Nageezi, Huerfano, Torreon, Lake Valley, Ojo Encino, and Pueblo Pintado) have expressed opposition to coal mining which is acknowledged in Chapter 4 of the draft and final EIS. We do not feel that it is necessary to include these letters in the EIS. These letters are on file in the Farmington Resource Area office and are available for the Secretary's decision and public review. The resolutions are part of the official record.

* * *

15.23 (68) The EIS must state methods used to count Navajo occupants.

Methods utilized to count Navajo occupants include both on the ground tract by tract inventories and an aerial (helicopter) survey during the spring of 1982. Data was also gathered and reviewed in cooperation with the BIA.

* * *

15.24 (68) The EIS states graves will be disturbed if they are not removed. Removal is a disturbance and this should be noted.

The text has been revised.

* * *

15.25 (349) Loss of property improvements, i.e., Barns, corrals, dams, windmills, wells, fences, cornfields, etc. is not mentioned or enumerated except for PRLA's where non dwelling facilities on homesite areas are mentioned. The value of the physical improvements and the homesites are not estimated.

15.25 (cont.) The value of physical improvements and homesites has not been estimated at this time, however, this will be a cost to the lessee, if the mine is developed. Therefore, there is no need to determine the value of improvements in this EIS.

* * *

15.26 (349) How many surface-users and owners are there? How many contacted? How many responded? How many consented to mining? How many refused to consent?

The total number of surface-users and owners (and consent) is given in a summary in Chapter 4 on the consultation process conducted by the BLM for individuals and families living on public lands. Specific numbers of families or individual users or owners (and consent) living on Indian lands or lands under Tribal authority is being determined by the BIA.

* * *

15.27 (300) (349) Adherence to the underlying policies of the Uniform Relocation Assistance Act, the American Indian Religious Freedom Act and the Fifth Amendment to the U.S. Constitution is not assured and adequate regard or treatment under these laws is not given.

The BLM has made an initial determination that the uniform Relocation Assistance Act does not apply. However, an individual may still seek formal eligibility under the act.

An alternative mitigation measure has been developed to apply the standards of the Uniform Relocation Act to coal leases. Chapter 1 states under committed mitigation that coal leasing must be carried out in compliance with federal and state laws. The BLM has complied with the American Indian Religious Freedom Action and the fifth amendment. Mitigation will be applied to protect sacred sites.

* * *

15.28 (335) The decisions not to legitimize the Navajo occupants of the PRLA areas despite the fact that the . . . Navajos in the San Juan - Chaco area have . . . lived there since . . . 1864. The decision was made without discussion of any of the twelve alternative methods of resolving these conflicts articulated in the final EA of the PRLAs.

The text has been revised in the "Alternative Mitigating Measures" section. The BLM is meeting with BIA and the Navajo Tribe on a regular basis and further discussion on relocation will occur.

* * *

(15.29) (335) The decision to arrange for lawful relocation of graves instead ;of declaring them unsuitable as cemetaries under unsuitability Criterion #3 of SMCRA undermines the credibility of the document.

According to OSM the definition of cemetaries under the unsuitability criteria may not include gravesites. However, BLM has incorporated these gravesites under Criterion 3. The gravesites are in fact unsuitable unless they are lawfully relocated. The BLM is not arranging or requiring relocation but providing for it. In addition the BLM is requiring a survey for gravesites.

* * *

(15.30) (335) The decision to require in-site preservation of only 1 of 4 known sacred sites on the PRLAs; the MFP decision brochure stated that 4 sacred sites in this district would be considered unsuitable.

After a close field exam and discussions with residents the BLM obtained more detailed information which indicated that actually only 1 of the 4 sites was located on PRLA lands. During these field exams an additional 4 sacred areas were identified and a mitigation stipulation applied. In areas with no sacred sites identified an additional stipulation was applied to contact the Navjo Nation and the Navajo Medicine Mens Association at least 180 days before conducting coal mining operations in order to identify any additional sacred areas. The BLM will also conduct ethnographic studies before or during mine plan review to identify additional sacred areas.

* * *

(15.31) (349) The following statement is made in the SJRRCL EIS, at Page 1-22, in reference to the Navajo Tribe's selection of 35,000 acres of BLM lands under Public Law 96-305:

> "The Department has this selection under active consideration but has not decided to approve the selection."

This statement implies that it is within the Bureau of Land Management's discretion to decide whether or not the selection is approved. Public Law 96-305 authorizes and directs the Secretary of Interior to make this transfer once the selection by the tribe is made. There may be no discretion not to transfer these lands after the selection, and the authority may

not be delegated to the BLM due to its conflicting interests with the tribe.

There may be a difference of interpretation between the Navajo Tribe and BLM on Public Law 96-305. The Department of Interior has not made a decision on this selection, but BLMs position is that there is discretion in this matter.

* * *

(15.32)
(349) The SJRRCL and NMGS EIS have to be changed to assess the very probable impacts of tribal regulatory authority and Navajo preference in employment.

Since no exchange has occurred this would be too remote and speculative to adequately address. In addition, the BLM has no idea how the Navajo Tribe would implement their regulatory authority.

* * *

16.1 (64) (335) The treatment of those unsuitability criteria is short, confusing, and incomplete. ...There is no explanation of why the criteria which BLM claims don't apply are inapplicable....(1) There is also no discussion of the reasons why the unsuitability criteria which do apply are not sufficient to prevent leasing. (2) The EIS says lease stipulations will be included to ensure compliance with the Surface Mining Act, but there is no description of those lease stipulations or mitigation plans.

The text has been revised. It is stated on page 1-13 of the DEIS that tract-specific stipulations have been developed for the PRLAs and are included in Appendix A-6. The FEIS also includes a copy of standard and general coal lease stipulations in Appendix I-1 and I-2.

* * *

16.2 (69) The coal EIS contains an error on page 3-59 which says owners on the "minimum surface owner conflict tracts" have consented to mining. Page A-5 shows that two allotment owners on the Kimbeto 1 tract have refused consent....this error should be corrected.

The text has been revised.

* * *

16.3 (86) ...on the third sheet of the San Juan Basin Projects Under Review (a handout given out at the public hearings) it states that there are 55 operating mines in the Basin. This is basically incorrect and is a five-year-old figure. There were 38 mines in New Mexico in 1981. This reflects the market problems in uranium. Most of these are operated by Kerr-McGee and Homestake Mining Corporation.

There are an additional 36 mines which are on standby and that means they have not been completely closed or abandoned.

I think the BLM should incorporate these changes into their documents. This information is readily available from the State Inspector of Mines.

The San Juan Basin Projects Under Review was prepared by BLMs New Mexico State Office and was provided as a summary of current development and of environmental documents prepared for actions proposed in the San Juan Basin. The figures on operating mines were used in the Under Review, but not in the San Juan River Regional Coal EIS. Information on current producing

16.3 (cont.) coal mines has been taken from State of New Mexico publications for changes made in the No Action Alternative.

* * *

16.4 (131) This report does not indicate if the leasing target of 1.2 to 1.5 billion tons of in-place Federal coal, established by the Secretary of the Interior, includes in-place Federal coal on PRLA's or only the Federal coal on competitive leasing coal tracts...Subsequent versions of the document should include clarification of what is included in the term "Federal in-place coal," and should discuss the status of PRLA's in the BLM preferred alternative.

The first sentence in the second paragraph under the Target alternative (page 1-10 of the DEIS) states that "This alternative proposes to lease 24 tracts..." The second sentence of this paragraph states "Federal in-place reserves that would be leased are approximately 1.32 billion tons...." Therefore, the amount of Federal in-place reserves proposed for leasing in the Target alternative falls within the 1.2 to 1.5 billion range. The 24 tracts being considered in the Target alternative are listed in Table 1-2 on page 1-7 as competitive coal lease tracts. The text has been revised to reflect the new proposed action.

Statements are made in all of the alternatives, except the No Action alternative, that"... Federal in-place reserves would be leased...." The BLM can only offer federal in-place coal for lease sale.

Revisions have been made in Chapter 1 of the FEIS in which the 26 PRLAs are addressed as a separate action, which would provide for issuing leases only on the PRLAs. This gives the Secretary of the Interior an additional action from which to make a selection when a decision on leasing federal coal in the San Juan River Coal Region is made. Until a decision is made, the Minimum Surface Owner Conflict Alternative is the preferred alternative.

* * *

16.5 (133) (335) We suggest that the mitigating measures should be defined and listed in the EIS.

Proposed mitigating measures, by resource component, are included in Chapter 3 of the FEIS. Committed mitigating measures are included in Chapter 1 of the FEIS.

* * *

16.6 (263) The Nageezi Tract as shown in Table 2-2 is not footnoted as an underground tract when in fact it is.

The text has been revised.

* * *

16.7 (263) The 1400 acres within the expanded community boundary of Pierre's Ruin does not include additional area required for barrier pillars to achieve no surface subsidence.

The amount of area needed for barrier pillars is not known at this time. Should this tract be leased, specific information on barrier pillars and other measures to ensure that there is no surface subsidence or disturbance would be provided in a mine plan.

* * *

16.8 (214) How much consideration has been given to first building the Star Lake Railroad just 23 miles plus a spur to Lee Ranch? Could the railroad be completed later, but only to Star Lake? Wouldn't the disturbance be less than what it would be in the area of present focus further north and west?

The location of the Star Lake Railroad right-of-way has been issued across public land. Construction of any portion of the railroad and the time frame involved is entirely at the discretion of the Santa Fe Pacific Railroad. The Star Lake-Bisti Regional Coal Environmental Statement (USDI, 1978) contains the impact analysis conducted on the placement and construction of the railroad.

* * *

16.9 (272) BLM should address the impacts which may result from proposed changes in the federal coal management Programmatic Memorandum of Agreement and the draft regulations of the Surface Mining Control and Reclamation Act of 1977.

This EIS reflects the current state of regulations and requirements. Final versions of proposed regulatory or Programatic Memorandum of Agreement changes are speculative. We recognize that any significant modifications in regulations, agreements, etc must be reflected in NEPA analysis prior to leasing or permit approvals.

* * *

16.10 (272) While the draft EIS (indicates) that BLM will include a number of protective stipulations in its leasing agreements, BLM does

16.10 (cont.) not indicate what its role will be in insuring that such stipulations will be enforced. BLM should also indicate whether such lease agreements can be altered subsequent to the publication of the final EIS.

The specific details of what is required by BLM, Office of Surface Mining (OSM), State of New Mexico and the lessee is contained in a monitoring plan developed upon approval of detailed mining operations submitted in the lessees mine plan. The monitoring plan will list all of the requirements (i.e. stipulations) required by law, regulation, memoranda of agreements, mitigation measures, etc. Procedures to monitor and enforce compliance of these requirements, by the appropriate federal, state, and local governmental agencies, are included in the plan at that time. The BLM has the authority to cancel a lease if the lessee violates the lease terms or applicable regulations.

The lease agreements can be altered after the final EIS and before notice of lease sale or decisions on PRLAs. Changes may require additional environmental analysis.

* * *

16.11 (272) BLM should address the question of federal coal leasing on lands under the jurisdiction of the Bureau of Indian Affairs, and indicate how Unsuitability Criterion 7 will be applied on the competitive tracts with split jurisdiction.

The BLM is the responsible agency for leasing federal coal. The BIA is responsible for the administration of federal funding and programs for Indian Tribes. This criteria was applied for all known cultural resources sites on all federal lands (or for lands overlying federal coal by the appropriate surface managing agency (BLM or BIA) with review and concurrance by BLM representatives as agreed to in the MOU signed by BIA and BLM in 1982.

* * *

16.12 (289) (310) (300) The interaction of the Navajo land selection with the coal leasing should be addressed both qualitatively and quantitatively in the EIS,... In addition, the interaction with the Navajo Tribe's suit to regain acreage in the 1907 and 1911 executive order restorations should be addressed. (page 1-22).

The relocation of Hopi's and Navajo's was specifically exempt from NEPA requirements as specified in the Navajo and Hopi Indian Relocation Amendments Act of 1980. BLM is required to place public land in a selection approved under this law in trust status for the Navajo Tribe. BLM is also required by

16.12 (cont.) federal law to complete work on the preference right lease applications submitted in the early to mid 1970's. If only the surface estate were transferred, a change in surface ownership because of the Relocation Act would result in the mining companies negotiating with the Navajo Tribe. The land selection and PRLAs will both be processed, therefore, it has been determined that further narrative is not required in the EIS other than to include the land selection under the Interrelationships section of Chapter 1. The Navajo Tribe's lawsuit has been included in this section of Chapter 1, but its environmental impacts are too remote and speculative for meaningful analysis.

* * *

16.13 (290) A table should be added to display the number of each Unsuitability Criterion, title of the Criterion, cooperating agency and summary of progress to date.

The text has been revised.

* * *

16.14 (290) The responsibility of BIA to apply Unsuitability Criteria to Indian lands should be explained. In addition, the opportunity to apply Criteria during mine planning stages should be explained.

See the response to comment 16.11 of this section for applying unsuitability criteria on Indian lands. The coal regulations (43 CFR 3461.4-1(a)) require the application of the unsuitability criteria before any leases are issued. Mine plans are developed on those tracts for which leases may be awarded, therefore, unsuitability criteria can not be applied during the mine plan stage of coal development.

Some of the resources regulated by the unsuitability criteria are based on federal laws which have independent application to other federal agencies. These include laws such as the Endangered Species Act. Despite the application of the unsuitability criteria, OSM would still have to ensure that mining as proposed is consistent with that law.

* * *

16.15 (290) Pages 3-1, A-71 and 72 should be clarified to indicate how additional survey data for Unsuitability Criteria will be incorporated into leases and mine plans.

Unsuitability criteria have already been applied for nesting sites and areas surveyed for threatened or endangered species. Measures to provide protection for unsurveyed areas or sites

16.15 (cont.) will be included in the lease. There is a lease stipulation and a recommended mitigation measure requiring complete threatened or endangered species surveys and surveys for species of high federal interest respectively. Information obtained from surveys would be considered with appropriate measures, as specified in the lease, taken to preserve significant sites and species.

* * *

16.16 (290) Additional fish and wildlife mitigation measures that should be considered include the following...(7 measures).

These mitigation measures have been considered. These measures are more appropriate for consideration and analysis in the environmental analyses prepared on specific mining operations presented in mine plans.

* * *

16.17 (290) Fish and Wildlife Service scoping input emphasized reclamation of wildlife habitat values, compliance with Section 7 of the Endangered Species Act, secondary impacts to fish and wildlife resulting from increased population, consequent social and economic developments, and mining impacts to intermittent and perennial aquatic habitats. This input should be included in the EIS.

The text has been revised. The compliance with section 7 consultation is not an issue because it is required by law.

* * *

16.18 (290) The draft EIS does not mention the proposed New Mexico Generating Station, New Town, or the BLM proposal to designate the Bisti and De-na-zin Wilderness Study Areas as wilderness. These projects are closely related to coal development and should be discussed.

These projects are covered in their respective EISs. The Cumulative Overview discusses significant impacts projected to result from approval and development of the New Mexico Generating Station, New Town, coal leases issued in the San Juan Basin and wilderness designation of the Bisti and De-na-zin WSAs.

* * *

16.19 (294) Specific government regulations defining the scope of the BLM as a management agency for the multiple-use of land should be stated in the introduction.

16.19 (cont.) A discussion of the Federal Land Policy and Management Act (1976), which provides the authority for multiple-use management of public lands, is included in Chapter 1 under the Authorities for Coal Leasing and Development.

* * *

16.20 (294) The Santa Fe-BLM Land exchange is only briefly mentioned...the issue needs to be addressed in greater detail.

The proposed exchange of federal and private coal is a completely separate action from that of issuing leases to mine coal. Therefore, the coal exchange proposed by Santa Fe Pacific Railroad Company is mentioned only as another project within the San Juan River Region. A detailed environmental assessment is currently being prepared on Santa Fe's pending coal exchange application.

* * *

16.21 (300) Scope of the "unsuitability criteria" should be expanded to account for the unique Navajo needs, beliefs, lifestyle and culture.

The unsuitability criteria are defined in 43 CFR 3461. Additional unsuitability criteria or changes in those currently defined in 43 CFR would require a change in the regulations.

* * *

16.22 (64) (300) ...other alternatives of the San Juan River Regional Coal Leasing, which can possibly be developed by combining one or more of the alternatives,...(including "Delay Action" alternative).

Based on industries interest in coal offered in the San Juan Basin and environmental considerations, the levels analyzed in the EIS were felt to reflect the most realistic levels that could be developed. Other levels could be analyzed, but the level of impacts identified would fall somewhere between the levels analyzed in the EIS. A delay of action alternative or staggering lease sales would result in a delay or extension, at a lower level, of the impacts identified in the EIS. The Secretary of the Interior has the option of delaying or staggering the competitive coal lease sale and leasing.

* * *

16.23 (300) (302) (335) Specific lease stipulations should be developed and made part of the final EIS relative to the following: reclamation; relocation of local residents; preservation; recovery and salvage of cultural and fossil resources; water management and a water

16.23 (cont.) use plan; legitimate handling of the complex land status and ownership problem in the San Juan Basin; guidelines for various mitigation plans, etc.

The FEIS does include lease stipulations and mitigation in Chapters 1 and 3, Appendices A-6, I-1, and I-2.

* * *

16.24 (309) "Leasing...would not increase annual production" in the Bypass Alternative. This statement contradicts Figure 1-1 for all years shown, from 1987-2000. (p. ix).

The text has been revised.

* * *

16.25 (309) The list of assumptions on page 3-2 contradicts the definition on p. 1-23 of "projects that are part of the No Action Alternative." (p. 3-2).

The text has been revised.

* * *

16.26 (309) "The analysis for each alternative assumes that all tracts would be leased and developed..." If the DEIS is going to assume all lease sale tracts are developed, then it has omitted any discussion of the reduced development which will have to occur elsewhere to bring production down to demand. (p. 3-3).

Reduced development was not considered. Total development was considered, particularly in the High alternative, for the worse case analysis required in the EIS. As was noted on page 3-3, "...what may realistically be expected to occur may fall short of (all tracts being leased and developed) in any given alternative." It is recognized that market conditions will be a determining and possibly limiting factor on what tracts would be leased and which of those leased would be developed.

* * *

16.27 (309) ...the DEIS contains no analysis of the impacts of the projects which would have to exist to make full production in the High Case possible...If the DEIS is going to assess the impacts of full production of leases in the High Alternative, then it must assess the impacts of the resulting synfuels plants, coal plants, or other uses of the additonal production. (p. 3-48).

The San Juan River Regional Coal EIS is limited to identifying and analyzing impacts that could occur from leasing and mining

16.27 (cont.) federal coal offered through Preference Right Lease Applications and competitive coal leases. Impact identification and analysis on energy related projects such as synfuel plants would be required only when it is clearly evident such facilities will be directly related to this coal development.

* * *

16.28 (310) The DEIS mentions a "Chaco-San Juan transition MFP" (p. 1-3), but nowhere discloses plans to write a Resource Management Plan for the region, as required by FLPMA.

Preparation of the Chaco-San Juan MFP was already in progress when the planning regulations (43 CFR 1601) were published in the Federal Register in 1979. Specific requirements to provide for a transition from ongoing MFP to complete RMP planning documents were included in the RMP regulations. These requirements were incorporated into the Chaco-San Juan land use plan. The Chaco-San Juan MFP land use decisions will remain in effect until a resource management plan is prepared for the Chaco and San Juan planning units.

* * *

16.29 (68) (311) (328) (330) ...the EIS fails to provide an analysis of the impacts of no development...the EIS must analyze the alternative of abandoning the proposed action entirely. See, e.g., NRDC v. Morton. 458 F.2d 827, 833 (D.C. Cir. 1972).

The text has been revised. The No Action alternative has been revised to clarify the impacts from no additional leasing of federal coal and to further segregate the impacts projected to occur from the development of the PRLAs.

* * *

16.30 (311) Because the final lease terms relate to the environmental impimpact of developing these PRLA's and to the commercial quantities determination, they must be included in the EIS.

Appendix I-1 and I-2 have been revised.

* * *

16.31 (321) The first sentence on page x appears out of place and is not supported elsewhere in the EIS.

The text has been revised.

* * *

16.32 (321) Under the summary of authorities granted by the Federal Land Policy and Management Act there should be added as item 5 the authority to exchange land or interests in land. (p. 1-12).

The text has been revised.

* * *

16.33 (321) This table of impacts of the alternatives should make clear that the numbers used to show acres affected by mining are those over the estimated life of mines, and that not all of these acres will be disturbed at once or at the same time.

Tables 1-7 and 1-8 were developed to present brief summaries of significant impacts projected to occur from the leasing and development of each alternative and to provide a basis of comparison of impacts between alternatives. Mining sequence and acres disturbed are found in the Surface Mine Reclamation section and Table 1-6.

* * *

16.34 (321) The statement is made that surface mining operations at Lee Ranch would result in air quality which would exceed the annual New Mexico standard. The record should show that the Lee Ranch Mine currently has a PSD exemption from the Environmental Protection Agency which was granted to SF Coal Corporation because of the emissions control measures which SF Coal Corporation has committed to put into effect. The resulting air quality, therefore, will not exceed the New Mexico annual standards. (Lee Ranch Middle Tract, p. A-14).

The text has been revised.

* * *

16.35 (321) The current state regulations governing coal surface mining in New Mexico are contained in New Mexico Coal Surface Mining Commission Rule 80-1, not Rule 78-1. (Appendix A-6, p. A-65).

The text has been revised.

* * *

16.36 (321) The figures given for "total surface area disturbed in acres" (Table B-9) for the Lee Ranch East, Middle, West and Divide tracts do not agree with the figures given on pages A-13, A-14, A-15, and A-16 for these same tracts. This discrepancy should be corrected.

16.36 (cont.) The figures in Table B-9 are for surface acres disturbed out of the total tract area presented in the summary reports in Appendix A.

* * *

16.37 (328) Page 3-1 refers to the fact that the EIS analyzes the impacts of mining on entire tracts, although most of their reserves are non-Federal. The logic contained in this paragraph is not entirely clear. If the tracts will be mined regardless of the Federal Government's actions, then why are they being considered in the analysis of the by-pass alternative?

This statement is concerned with impact identification and analysis regardless of the amount of private or federal coal resources. Due to the large amount of private coal in some of the competitive coal lease tracts, it is assumed that mining would occur with or without leases to mine federal coal. Impacts associated with the mining of federal coal would result in a slightly higher amount of impacts occurring from the development of private coal. Competitive coal lease tracts with minimal amounts of federal coal are considered in the other alternatives.

* * *

16.38 (328) In the No Action alternative (Chapter 1) the statement is made that in-place reserves for leased Federal coal are approximately 2.2 billion tons. This needs to be clarified. Is this coal that is currently under lease today? — or is this coal under lease today, plus the PRLA's.

The text has been revised.

* * *

16.39 (328) "Minimum surface owner conflict" should be explained. What conflicts are expected under other alternatives and why are they absent under this alternative. (page 1-9).

The text has been revised.

* * *

16.40 (328) This section should be expanded to describe Mining and Mineral Division (MMDs) role and authority in the administration of SMCRA. (page 1-12).

This information is provided in the Surface Mine Reclamation section of Chapter 1.

* * *

16.41 (328) What are "support facilities". (Assumptions and Analysis Guidelines #3. (page 3-2).

Support facilities are facilities which are required to aid in coal mining such as mine load out facilities, administrative buildings and roads.

* * *

16.42 (328) (330) Considering the massive environmental impact described in this document, it is not clear how the proposed action outweighs the negative effects mentioned. Some type of cost/benefit analysis should be presented with a description of the methodology utilized for review and discussion.

So that conclusions can be drawn and proper decisions made, specific discussions are presented in the EIS where qualitative analysis is not proper or difficult to assess. We feel that adequate qualitative analysis has been made in this document.

* * *

16.43 (330) BLM has not included the results of (the unsuitability) analysis in the land use plan, the PRLA EA, or this EIS, and what results the three documents contain contradict each other. (Unsuitability criteria)...should be described in a revised draft EIS in a fashion that the public can understand and comment on.

The text has been revised.

* * *

16.44 (68) BLM must prepare a single, regional EIS addressing all elements of the Action Plan...

The BLM's analysis of the pending energy and wilderness-related proposals in the San Juan Basin fully complies with NEPA, including any requirements for analysis of cumulative effects described in Kleppe v. Sierra Club, 427 U.S. 390 (1976). NEPA requires a federal agency to consider cumulative impacts of related proposals, and to do an analysis of the impacts of a proposal for a regional plan or program. No regional plan or any proposal for a regional plan or program exists in the San Juan Basin, although there are several proposals pending before the BLM. The proposals are NMGS, competitive and PRLA coal leasing and wilderness study areas. The BLM chose to study the environmental impacts of these pending proposals by: (1) preparing an environmental impact on each proposal; (2) preparing a cumulative overview to study the cumulative and synergistic effects of the proposals; and (3) by circulating the documents

16.44 (cont.) together to allow coordinated agency and public review. To facilitate this review, the final coal and NMGS EIS's each concontain a full summary of the cumulative overview, the changes made to the cumulative overview as a result of comments and th response to comments made on the cumulative overview. In Kleppe v. Sierra Club, 427 U.S. 390, 410 (1976), the Court said that when proposals "that will have cumulative or synergistic environmental impacts upon a region are pending concurrently before an agency, their environmental consequences must be considered together." This is exactly what was done here. The structure and format allows efficient use of BLM and public resources and ensures a hard look will be taken at impacts of the pending actions which have related or connected effects. The procedures result in a full and fair look at the proposals with no intent or effect of minimizing their cumulative effects through segmentation or separate consideration. The proposals are, as Kleppe v. Sierra Club requires, being considered together.

* * *

16.45 (68) The EIS excludes two important alternatives besides no-action. One is the alternative of producing coal outside the San Juan Basin. A second is production of energy from non-coal sources, including conservation and renewables.

The alternative of leasing coal outside of this region is not within our jurisdiction and is not considered a reasonable alternative (40 CFR 1502.14). The action being considered in this EIS is to lease or not lease federal coal. Production of energy from other sources is not within the scope of this EIS and again is not considered a reasonable alternative. These issues are analyzed in the Final Environmental Impact Statement: Federal Coal Management Program (USDI, BLM, 1979).

* * *

16.46 (68) Why does this table (1-5) exclude some sites found unsuitable in the Management Framework Plan update? E.g. areas of ongoing paleontological study.

Paleontology permits issued in the area of the coal tracts are for generalized mapping, inventory, reconnaissance, discovery and surface sampling over a large area. It was not the intent of this criteria to qualify such large areas as unsuitable for surface coal mining. (Instruction Memorandum No. 81-340). There are no discrete fossil deposits under permit in the coal tracts and consequently no acreage was determined to be unsuitable at this time. The area known as the Fossil Forest, within several PRLAs, has been withdrawn from coal mining for a period of 10 years so the area can be extensively and systematically

16.46 (cont.) excavated in order to recover known fossils. This has been made a part of the lease terms for those PRLA holders. If any discrete sites are located and a permit issued, that particular area would not be allowed to be mined until excavations are completed.

* * *

16.47 (68) If the assumption of complete sale, development and markets is really intended as a worst-case analysis, p. 3-3 the probability of the worst case must be addressed. 42 C.F.R. 1502.22(b).

The text has been revised.

* * *

16.48 (68) Summaries of need analyses relied on by BLM must be included in the EIS for public review and use by the decision makers. 40 C.F.R. 1502.21.

This section of the CEQ regulations is concerned with summarizing and referencing material that would add substantially to the length of the document but would not add to the analysis required in the EIS. Material is not included in the document that is "reasonably available" for public inspection. This information is available from the New Mexico State and Washington BLM offices.

* * *

16.49 (68) Has consultation been completed? It was not done and completed during the land use planning stage, as required by 30 U. S. C. §§201, 1304. A-47.

The surface owner consultation process has been completed.

* * *

16.50 (68) What specific actions, in addition to preference right leasing, are included in the no-action alternative? (see p. 1-23).

The No Action alternative has been revised. There are no actions proposed under this alternative.

* * *

16.51 (45) (304) (333) Better analysis of the coal production needs of the region is needed in the EIS and should reveal that coal leasing of a magnitude proposed in the preferred alternative is unwarranted from any perspective.

16.51 (cont.) The need for New Mexico coal was considered and analyzed when the leasing targets were set. There was extensive industry and public input and this input was given serious consideration when the targets were set. In addition, the target was lowered due to public input and additional analysis of need. The market will also determine if there is a need for New Mexico coal.

* * *

16.52 (335) BLM states that no independent EIS has been prepared in relation to the issuance of the PRLAs...a number of available courses of action, any one of which will either directly or indirectly determine whether a lease will be issued. These alternatives should be analyzed according to NEPA procedures.

The comment incorrectly rephrases the BLM position. The source for the comment is the errata sheet to the draft EIS. The errata refers to why the PRLAs were in the no-action alternative. The text has been revised to place the PRLA in a seperate action.

* * *

16.53 (335) The lease stipulation does not state what criteria will be used to determine whether or not to conduct an (paleontological) appraisal, or what information the decision will be based on.

A determination on conducting a paleontological appraisal will be made based on a recommendation of a paleontologist. Published literature, field appraisals and consultation with the professional and academic community as appropriate will be the basis for the paleontologist decision. The review and determination of paleontological appraisals are made on the mine plan, which is available for public review.

* * *

16.54 (335) ...there has been considerable change in the proposed action and its impacts since the time of the PRLA EA, and up-to-date environmental analysis is needed.

The proposed action to issue leases on pending preference right lease applications has not changed. The same action is proposed as an alternative in the EIS. Additional impact analysis was conducted in the EIS for those areas needing additional consideration and analysis.

* * *

16.55 (356) ...we object to the tract-specific impact and mitigation discussions contained in this DEIS as being premature. The effects of mining should only be addressed generically in this EIS with specific tract assessments deferred to the site-specific EIS required for each project at the permitting stage.

The BLM has attempted to analyze the impacts as specifically as possible. The BLM recognizes that the specific details of mining are not available yet. Tract analysis, based on generic mining plans, are necessary for site specific review in determining the suitability for leasing and the basis for regional impact analysis. A more detailed analysis will be necessary at mine plan stage.

* * *

16.56 (356) Discussions of this tract (page A-11, Bisti #6/8 Tract) should acknowledge that as a bypass tract, it would be mined only in conjunction with a larger operation on adjacent lands.

The information presented in Appendix A-1 contains summaries of each of the 39 tracts. The summaries contain specific mineral and geologic information and the types of impacts that are projected to occur. The information you are requesting is presented in Chapter 1 under the Bypass alternative and Table 1-2. The text will remain as written.

* * *

16.57 (356) Recreation impacts state that this tract (page A-21, Bisti #4 Tract) is located within the Fossil Forest. However, the description of the Fossil Forest on p. 2-30 of the DEIS, and maps included with the DEIS, dispute this claim.

The text has been revised.

* * *

16.58 (356) ...please note that this tract (page A-27, Bisti #2 tract) is nowhere near the Ah-shi-sle-pah WSA.

The text has been revised.

* * *

16.59 (300) (349) Certain coal tracts, where environmental impact is tremendous and the relocation problem is serious, should be dropped from lease sale.

* * *

16.59 (300) (349) (Cont.) The Secretary of Interior does have the discretion to drop tracts from the lease sale based on environmental reason. In addition exchange alternatives which would eliminate PRLAs which have residences are analyzed in this document.

* * *

16.60 (300) (349) The Navajo Tribe made a list of 17 "demands" in their comment letter these should be adopted.

These demands, with the exception of recognizing the tribe as a qualified surface owner, are adopted as alternative mitigation for consideration by the BLM. The reasons for not recognizing the tribe as a surface owner is outlined in Comment 15.12.

* * *

16.61 (335) No mention is made of the fact that PRLAs ... may not be issued because of legal infirmities. This fact will substantially impact any analysis of the effects of additional leasing on the San Juan Region.

This EIS reflects the current state of regulations and requirements. Changing the analysis to cover the outcome of potential litigation is speculative and is not within the scope of this document

* * *

16.62 (335) The SJRRC EIS does not address the need for the proposed coal development or the market for which this coal will be produced. Before approval is given to issue new competitive coal leases...there should be a demonstration that there exists a real demand for the additional coal.

Extensive public comment and discussion was made on the original coal targets. In response to that input, the target was set at 1.2 to 1.5 billion tons. After the Draft EIS additional input and information was obtained concerning the level of new competitive leasing, the target was lowered to 800-900 million tons. Refer to comment 2.12 for additional discussion of the coal markets.

* * *

GENERAL COMMENTS

16.63 (328) Comment: One commenter requested a supplemental EIS on at least the following issues: (1) a fair market value determination must be made; (2) PRLA stipulations must be site-specific; (3) every effort must be made to protect wilderness; (4) every effort must be made to provide relocation assistance to Navajos affected by coal development; and (5) inaccuracies exist in geology, paleontology and cultural resources.

Response: Although a supplemental EIS is not required the BLM has decided to release this EIS as a second draft. This decision has the same effect as would release of a supplemental EIS. The document has been revised to cover the commentor's concerns.

* * *

16.64 (311) (330) Comment: Several comments claimed that the DEIS was so inadequate as to preclude meaningful comment on the PRLA's and that a new draft was required. The basis for this request was allegations of inadequate discussion of site-specific impacts, failure to discuss required alternatives, inaccurate and insufficient discussion of wilderness conflicts, visual resources, reclamation, surface and ground water, air quality, socioeconomic effects and transporation, lack of meaningful analysis of unsuitability criteria, inadequate discussion of mitigation measures, failure to include lease terms in the EIS, failure to address economic costs of lease stipulations, no true "no action" alternative, and failure to include results of surface owner consent.

Response: CEQ regulations, 40 CFR 1502.9(a), say that "If a draft statement is so inadequate as to preclude meaningful analysis, the agency shall prepare and circulate a revised draft of the appropriate portion." This issue, therefore, is whether the discussion in the DEIS, on the issues the commenters raised, allowed meaningful analysis.

In response to comments on the DEIS the BLM has changed the part of the DEIS that addresses the PRLA's. The changes include separating the PRLA's from the no-action alternative into a new alternative, expressly discussing in the DEIS exchange alternatives and alternative lease terms rather than referring the reader to the Final Environmental Assessment on PRLA's in New Mexico (FEA), and including summaries of proposed lease terms for individual PRLA's in the DEIS rather than including a "model" lease with all potential terms, with the actual text of the proposed terms being available in BLM offices. Furthermore, to assist the reader, and to reduce the need for cross-referencing, additional summaries of environmental considerations for individual PRLA's have been included in the DEIS.

After considering the extended, extensive and active public participation process that has occurred in New Mexico as part of BLM's consideration of the PRLA's, and detailed analysis of the individual issues that were raised. The BLM has concluded that the commenters have had a meaningful opportunity to inform the agency of their views.

Although the record does not require a new DEIS, the BLM has carefully considered the concerns that motivated the requests for a new DEIS. The decision whether to issue PRLA's in the San Juan Basin, and, if so, under what conditions, is an important natural resource issue touching on many people's lives and on a basin which contains many special environmental values. Proper coal resource development in the San Juan Basin must include the proper combination of scientific study and

16.64 (Cont.) natural resource protection, as well as State and Federal sensitivity to the social and economic issues coal development raises. To ensure that the State of New Mexico, the Navajo and Jicarilla Tribes, and the public will have the maximum opportunity to make their views known to the decisionmaker, and to avoid litigation on the Draft EIS's adequacy the BLM has decided to publish this document as a second draft EIS.

As stated above, the BLM has considered the commenters' points in detail. The discussion which follows responds to the comments.

1. Need for Additional Site-Specific Information in the DEIS.

Several commenters claimed that a new draft was needed because the November 30, 1982 DEIS lacked adequate site-specific information. A review of the DEA, the FEA and the DEIS does not support this contention; to the contrary, it reveals extensive, detailed and significant site-specific information. A list of the significant information for the major subject areas follows:

Subject	Source
Land Status	DEA Appendix A-1; FEA Table 1-1, Map 1-1
Areas of Mining Operations	FEA Map 1-3
Summary of Effects by PRLA	FEA Table 1-2, Table 1-5
Cultural Resources including Gravesites	DEA Table 2-12, 2-14; FEA Table 2-12 A; DEIS App. F-4
Paleontology	DEA Table 3-6; FEA Table 1-5
Topography	DEA Map 2-1
Navajo Occupancies	FEA Table 2-18; DEIS App. F-1, Visual D
Land-use Conflicts, including Oil, Gas and Rights-of-way	DEA Map 2-2; DEIS App. E-2, E-3, E-4

16.64 (Cont.)

Vegetation Types and Soil Associations	DEA Table 2-3, Map 2-3, App. C-2, G-2
Hydrologic Features, including Floodplains	DEA Map 2-4, 2-5, App. F
Wildlife	DEA Map 2-6, Table 2-7; DEIS App. A-7
Grazing Use	DEA Table 2-8, 2-9, 3-4, Map 2-7, App. G-1
Visual Resources Visual B	DEA Table 2-16, Map 2-12; DEIS 3-14,
WSA Conflicts	DEA Table 3-5; Draft Proposed Wilderness Areas EIS, generally and Map B
Unsuitability criteria	DEIS p. 1-13-15, Table 1-5, App. G

The DEIS specifically refers the reader to the FEA (and the DEA since it is a part of the FEA) and the Draft Wilderness EIS. For the areas referenced, the FEA is an integral part of the DEIS, and DEIS's adequacy must be reviewed together with the referenced documents. The material in the FEA was not included in the DEIS to avoid unnecessary duplication, to eliminate bulk and to concentrate on the new information that was being presented. Additional information available in the BIM files shows the actual proposed lease terms for each PRLA.

Review of the proper documents reveals extensive site-specific information on a wide variety of environmental resources, and provides information that is needed to make an informed choice among the alternatives.

While the persons who raised this issue may not have reviewed the FEA, their comment may also stem from a different view on how much information should be in the DEIS.

A decision to issue a federal coal lease is an irretrievable commitment of resources to the extent that the government conveys coal lease rights that may be exercised only if the lessee shows that the coal can actually be developed in accordance with applicable laws, regulations and lease terms. For these PRLA's the proposal requires the lessee to gather very detailed resource information and to prepare an application for and to seek approval of a permit under the Surface Mining Control and Reclamation Act. This Act includes requirements for detailed studies and plans on revegetation, hydrology, geology, fish and wildlife and air quality. The lessee must combine this information into a plan that shows the land

16.64 (Cont.) will be returned to its approximate original contour and premining productivity. It must show that the lands can be revegetated, that the hydrologic balance will be restored and that appropriate protection will be given to fish, wildlife, cultural and paleontological resources. To be given a permit to mine, the lessee must be able to show that achieving these environmental protection standards is environmentally and technologically feasible. According to the New Mexico Department of Energy and Minerals, cost of gathering this information for a new mine regularly exceeds one million dollars.

Once a lease has been issued and the lessee has definite plans to begin mining, it is necessary and proper to require that information of this type be presented for public review. But, the purpose of environmental analysis at the lease issuance stage is not to make a final irrevocable decision about mining. The goal is different. The goal is to identify potential conflicts which may cause problems if mining goes forward and to either eliminate the problem areas from each lease or to condition development through lease terms to retain the right to protect these potentially difficult areas if the more detailed study shows that the lessee is unable to develop the techniques to resolve the problem.

The CEQ regulations both recognize and encourage the use of tiering. The coal leasing program is a tiered program with programmatic analysis followed by regional and general site-specific analysis at the leasing stage followed by more detailed analysis of the mine plan stage. The costs of gathering the level of information at the leasing stage similar to that required for Surface Mining Control and Reclamation Act are exhorbitant and are not necessary for a reasoned and informed choice among the alternatives due to the strict environmental protection program which follows lease issuance.

2. Discussion of Alternatives to PRLA Issuance and Alternative Lease Terms.

Another reason alleged in support of the request for a new DEIS is a challenge to the adequacy of the DEIS' discussion of alternatives to PRLA issuance and of alternative lease terms. The DEIS does not expressly address either of these items but does refer the reader to the FEA. The FEA says that exchanges of PRLA's could be done "when it would be in the public interest to shift the impact of mineral operations . . . to preserve public resource or social values . . ." FEA page 150. The FEA, page 150, also states that lease terms other than those in the standard lease form could be included in the leases issued to PRLA holders. The DEA briefly analyzes

16.64 (Cont.) several alternative lease terms. DEA at 3-12, 18, 23, 25, 27. Additional alternative lease terms are included in the FEA at 157-62.

In addition to this material, the DEIS explains that "tract-specific stipulations for the PRLA's have been developed . . ." DEIS at 1-13 and refers the reader to Appendix A-6 for examples of the types of lease terms in addition to the standard lease terms that the BLM had proposed to include in leases issued to PRLA holders. Pages 3-51-3-53 list 11 other possible terms.

Furthermore, before it published the DEIS, the BLM had available for inspection a specific set of stipulations, supporting rationale and maps showing proposed terms and conditions for each of the 26 PRLA's. These were based on the results of land-use planning, application of unsuitability criteria, comments on the FEA by the public, and suggestions by the Bureau of Indian Affairs and other federal agencies. Copies of these actual terms and conditions were asked for and given to the Natural Resources Defense Council, the Southwest Research and Information Center, the State of New Mexico, and others both before the publication of the DEIS and during the comment period on the DEIS.

Appendix A-6 of the DEIS, and all letters to PRLA holders transmitting to them these proposed lease terms say:

> As a result of our analysis of the [San Juan River Regional Coal Leasing] EIS, we may require changes in the stipulations . . . . For this reason, we will not reach a final decision on your application until after the EIS is done.

The material in the FEA and the DEIS fairly put the public on notice about the consideration of exchange alternatives and the possibility that alternative lease terms would be selected. In response to public comments on the DEIS, the exchange alternative was brought forward into the DEIS text and expanded by adding a discussion of specific exchange possibilities. The exchange possibilities are, in part, the result of concerns raised by commenters about the social or environmental effects of PRLA issuance. The revised text discusses suggestions for particular exchange proposals including the Ah-shi-sle-pah proposal by the State of New Mexico.

Similarly, the discussion of alternative lease terms has been brought forward into the DEIS text, as well as the basis for alternative lease terms more clearly expanded. Additional and revised alternative lease terms have also been added in response to specific lease terms suggestions by the BIA, the Navajo Tribe, the State of New Mexico, and others.

16.64 (Cont.) Despite the claims of some commentors, the record shows that the public has had a meaningful opportunity to comment on exchange alternatives and alternative lease terms, and has, in fact, exercised that opportunity in a way that has influenced the decisionmaking process.

3. No-Action Alternative.

The commenters also claim that a new draft is needed because the PRLA's were in the no-action alternative in the DEIS. This they say resulted in a failure to analyze the effects of not issuing any new federal coal leases.

The BLM agrees with the comment to the extent that the impacts of PRLA issuance are more understandable if the PRLA's are included in an alternative of its own. They were originally placed in the no action alternative to distinguish them from the totally discretionary actions related to competitive leasing. Despite the original placement of the PRLA's, the DEIS and related documents still gave the public a meaningful opportunity to comment on and understand how PRLA leasing would increase environmental impacts above the level of no federal coal leasing, either PRLA or competitive.

The allegation that the DEIS fails to assist the reader in obtaining an analysis of the effects of a base without any new federal coal leasing is incorrect. The column captioned "other Projects Total" in the DEIS, Table 1-7, shows the enviromental effects which would occur without coal development which would result from new coal leasing. In addition, DEIS Figure 1-1, clearly shows the amount of coal production which could be expected to occur without any new leasing. Chapter 3 also contains information which distinguishes between a no-action including PRLA's and a no-action excluding PRLA's. E.g. DEIS, Tables 3-2, 3-13, and 3-19.

The revised presentation in the DEIS facilitates analysis of a no-action alternative without any leasing.

4. Lease Terms: Availability and Cost.

The commentors allege that a new draft is needed because the DEIS did not contain actual lease terms for the PRLA's, the estimated cost of compliance with the lease terms, and the lease terms are not site-specific.

This comment does not provide a basis for a new draft because 1) site-specific terms have been prepared for each PRLA, 2)

16.64 (Cont.) although the lease terms for each PRLA were not in the EIS, a model lease was printed, and 3) the actual terms for each PRLA are available for inspection in BLM offices. NEPA does not require the cost of compliance with lease terms to be in the EIS.

As stated in response to the comment challenging the adequacy of the DEIS' consideration of alternative lease terms, the BLM has prepared site-specific terms for each PRLA and has prepared a map for each PRLA showing where conflicting resources are located within the PRLA. This was done on an individual basis and on factual information specific to each PRLA. This information is and has been available for inspection in BLM offices in New Mexico and has been made available free of charge to those who asked for it. The actual documents comprising this information contain approximately 10-15 pages for each PRLA. As permitted by 40 CFR 1502.21, bulky material can be incorporated by reference and that was BLM's intent for this material in the DEIS. In any event, both groups which raised this issue had actual notice of the proposed lease terms before the end of the comment period, they and others had a meaningful opportunity to comment on this issue.

On a related subject, the commenters also criticized the adequacy of the discussion of mitigation measures. The section on mitigation measures has been strengthened, its relationship to the proposed action better explained, and new measures proposed. These changes represent only a clarification of the course presented in the DEIS and do not deprive the public of a meaningful opportunity to comment.

5. Discussion of Specific Resources.

As another basis for a new draft, the commentors allege that the DEIS was deficient in its discussion of wilderness conflicts, reclamation, surface and ground water, air quality, socioeconomic effects and transportation. Most of these areas have been improved from the DEIS, but all of the changes are to improve the analysis and do not result in any change in evaluation which discloses significant new effects on the environment. Since the revised text is related to the DEIS, this is no basis for a new DEIS. Most of the criticism of this analysis appears to stem from the difference in expectation for information discussed under point 2 above. Additional information of the treatment of comments on individual resources may be found in the response to comments for that resource.

6. Unsuitability Criteria.

The allegation is that a new draft should be prepared because the unsuitability criteria were not meaningfully analyzed. The

16.64 (Cont.) thrust of this comment is not clear. The application of unsuitability criteria is required by the Federal Coal Management Program, and the criteria and their exceptions are set out in the regulations in 43 CFR Subpart 3461. They are nondiscretionary and not subject to change by BLM field-level officials.

The DEIS explains why the unsuitability criteria are being applied, what the results of the applications were, and refers to Appendix A-6 which shows how the results of the application of the criteria were sent to the PRLA holders. In addition, the BLM offices have on file and available for inspection the detailed results of the application and a map showing the results in graphic form. It is difficult to see how this description could, in any way, have hindered public review.

7. Surface Owner Consultation.

A final point raised in support of a new draft was that the results of surface owner consultation were not included in the DEIS. This is not a basis for a new draft for two reasons. First, the DEIS does include a summary of the results or consultation DEIS p. 4-4, and a copy of the letter requesting surface owner's opinions. Second, and more importantly, the process of consultation is, by law, only applicable to competitive coal leasing.

8. Need for a New Draft to Allow Meaningful Public Participation.

The public participation process specific to these PRLA's began in 1980 as part of the preparation of a draft Environmental Assessment (DEA). Before the DEA was published, the formal public participation process included 16 scoping meetings, meetings with Federal agencies, and interviews with Navajo religious specialists as well as extensive informal public information efforts including preparation and mailing of a Chacoan newsletter to over 2,000 people to keep them informed about development plans. Public meetings on the DEA were held at six different places. Many of these meetings were held at Navajo Chapter houses with BLM-employed Navajo interpreters available to make presentations and answer questions for those who did not speak english. These same BLM employees have spent months of time visiting individual Navajos and trying to keep them informed on important developments.

The BLM received numerous comments on the DEA from a variety of organizations representing a broad segment of the interested public. One of the major concerns expressed on the DEA was the need to prepare an environmental impact statement before BLM decided whether to issue the PRLA's.

16.64 (Cont.) After the FEA was completed, the BLM decided that the issuance of the PRLA's was a major federal action significantly affecting the human environment, that an environmental impact statement was needed, and that the PRLA's should be analyzed in the San Juan River Regional Coal EIS. Accordingly, the PRLA's have also had the benefit of the extensive public participation process related to the preparation of this EIS. This public participation process is described in Chapter 4 of this document. The process included 9 Regional Coal Team meetings where PRLA issues have been discussed. All of this public participation is of course, in addition to the numerous meetings, discussions and public participation in the coal-oriented Chaco/San Juan Management Framework Plan.

Through over 3 years of public participation, the public has been vocal, active and informed. Many segments of the public oppose coal development in the Basin and have expressed their views directly and indirectly by highlighting concerns over revegetation, water, conflict with wilderness, paleontology and cultural resources, effect on Navajos living in the area and general socioeconomic concerns. Others have favored coal development and have sought to limit any constraints from being placed on coal development. Most importantly, the BLM has been influenced by this public participation in its decision to do an EIS on the PRLA's, in its development of proposed lease terms and conditions, and in its efforts to work with the Navajo Tribe, among others. Despite this extensive record of public participation, and because of it's commitment to public participation, the BLM has decided to publish this document as a second Draft EIS.

* * *

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APPENDICES

APPENDICES

APPENDIX A
BACKGROUND INFORMATION

APPENDIX A

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APPENDIX A-1

TRACT SUMMARIES

LA PLATA #1 TRACT
FEDERAL OWNERSHIP - SURFACE MINE

The La Plata #1 Tract, approximately 200 acres in size, is located 15 miles north of Farmington, New Mexico. Land surface and coal within the tract are federally owned. The tract total and unleased coal is an estimated 8.8 million tons of mineable reserves and 7.5 million tons of recoverable reserves. The expected peak production rate would be 1.5 million tons per year for a projected mine life of 7 years. Total expected revenue from federal coal within the tract is $150 million with an expected federal royalty value of $18.8 million for the life of the mine. Approximately 40 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 200 acres.

Approximately 112 employees would be needed to mine the reserves. The mining activities would require approximately 30 acre feet/year of water from deep wells for mining operations.

Surface disturbance on the acreage of each tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling, and reclamation. The hydrological resource impacts include destruction of stratified nature of Fruitland formation overburden and all confining layers above the Pictured Cliffs Sandstone. These would be replaced with crumbled shale and sandstone rubble having a greater porosity than the original stratified material. This may result in upward leakage from the underlying Pictured Cliffs Sandstone which contains water of a much greater salinity. There is also a possibility of changes in water quality in wells and lowering of water levels in wells tapping the same aquifers in vicinity of the tract.

Paleontological resources show no significant impacts. Total acreage disturbed on the paleontological resources would be 250 acres.

The impacts to the range resources would be the loss of 19 AUM's of forage over the life of the mine and the destruction of one stock reservoir.

LA PLATA #2 TRACT
FEDERAL OWNERSHIP - UNDERGROUND MINE

The La Plata #2 Tract, approximately 200 acres in size, is located 15 miles north of Farmington, New Mexico. Land surface and coal within the tract are federally owned. The tract total and unleased coal is an estimated 12.0 million tons of mineable reserves and 2.0 million tons of recoverable

reserves. The expected production rate would be .50 million tons per year for a projected mine life of 7 years. Total expected revenue from federal coal within the tract is $52.5 million with an expected federal royalty value of $4.2 million for the life of the mine. A maximum of 80 surface acres would be disturbed over the life of the underground mine for placement of the related surface facilities.

Approximately 125 employees would be needed to mine the reserves. The mining activities would require approximately 40 acre feet/year from deep wells for mining operations.

Impacts from ground water include seepage of water from the underlying Pictured Cliffs Sandstone into the mine which might effect yield and water levels in wells. Subsidence might disrupt overlying bedrock aquifers in the Fruitland formation by fracturing them and affect potential ground water supplies from that aquifer.

The range resource impacts would include the loss of 8 AUM's of forage for the life of the mine on the surface facilities.

The impacts to cultural resources would be one Anasazi site and a portion of another, LA 5605. The LA 5605 site consists of a 500 foot by 3,500 foot habitation site and is also located in La Plata Tract #4. These sites may be destroyed by surface activities associated with the underground mining.

STAR LAKE WEST #2 TRACT
MIXED OWNERSHIP - SURFACE MINE

The Star Lake West #2 Tract, approximately 760 acres in size, is located 30 miles west of Cuba, New Mexico. Of the total 760 acres for land surface 440 acres are unleased Federal, and 320 acres are State. The acreage for the coal reserves is 760 acres unleased Federal.

The tract contains mineable reserves of unleased Federal at 28.0 million tons with the tract total of 28.0 million tons. The recoverable reserves tonnage of unleased Federal is 24.0 million tons with the tract total of 24.0 million tons. The expected peak production rate would be 2.0 million tons per year for a projected mine life of 14 years. Total expected revenue from federal coal within the tract is $470 million with an expected federal royalty value of $58.8 million for the life of the mine. Approximately 65 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 760 acres.

Approximately 150 employees would be needed to mine the reserves. The mining activities would require approximately 65 acre feet/year of water from deep wells for reclamation and dust control.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling and

reclamation. The hydrological resource impacts include destruction of stratified nature of Fruitland formation overburden and all confining layers above the Pictured Cliffs Sandstone. These would be replaced with crumbled shale and sandstone rubble having a greater porosity than the original stratified material. This may result in upward leakage of water from the underlying Pictured Cliffs Sandstone which may contain water of a much greater salinity than the water in the fruitland formation. Possible offsite reduction of well yields, lowering of water levels, and changes in water quality in wells. Withdrawal of ground water from deep aquifers for reclamation and dust suppression would alter ground water flow near the wells and may cause a lowering of water levels in wells tapping the same aquifers in vicinity of the tract.

Surface Water impacts include the following:

a. Runoff from mined area would be impounded, resulting in an unknown but probably small amount of surface water lost to evaporation.

b. Increase in dissolved and suspended solids concentrations in runoff during reclamation phase until channels stabilize. This area requires special attention during the mining and reclamation phases because a major tributory to Chaco Wash, Arroyo Pueblo Alto, drains the area.

c. Use of saline or sodic ground water from "deep" aquifers may impact water quality of runoff from reclaimed areas.

d. 16 acres of floodplain on Arroyo Pueblo Alto in T. 20 N., R. 6 W., Section 18 would be disrupted.

The loss of approximately 58 AUM's of native forage over the life of the mine would occur.

The visual resources in this tract are in Class III management area and surface mining would not meet the management objectives for this classification.

Paleontological resource impacts for this tract reveal no fossil localities recorded. However, potential for subsurface fossils contained in the overburden is high. Although high probability exists for the destruction of any megafossils and associative data, the microfossil, invertebrate and botanical material could still retain a certain degree of scientific and educational utility. The estimated fossil localities disturbed in the first year would be 10. The total acres disturbed is 760. While the estimated total number of fossil localities disturbed is 51.

Cultural resource impacts indicate that two isolated localities have been recorded. Sites in the tract would be destroyed by mining activities.

As for any recreation impacts, surface mining activities on Star Lake West #2 could disrupt the Continental Divide National Scenic Trail location.

KIMBETO #1 TRACT
MIXED OWNERSHIP - UNDERGROUND MINE

The Kimbeto #1 Tract, approximately 3,680 acres in size, is located 1 to 3 miles south of the settlement of Kimbeto and/or 45 miles southeast of Farmington, New Mexico. Of the total 3,680 acres for land surface 2,240 acres are unleased Federal, and 1,440 acres are private. The acreages for the coal reserves are 3,360 acres unleased Federal, and 320 acres for private.

The tract contains mineable reserves of unleased Federal at 75.7 million tons with the tract total of 825 million tons. The recoverable reserves tonnage of unleased Federal is 38 million tons with the tract total of 41 million tons. The expected production rate would be 1.1 million tons per year for a projected mine life of 37 years. Total expected revenue from federal coal within the tract is $948 million with an expected federal royalty value of $75.8 million for the life of the mine. A maximum of 80 surface acres would be disturbed over the life of the underground mine for placement of the related surface facilities.

Approximately 275 employees would be needed to mine the reserves. The mining activities would require approximately 23 million gallons of water per year from deep wells for mining operations.

Impacts on ground water from deep aquifer(s) for dust suppression and reclamation would alter ground-water flow near the well(s) and may cause a lowering of water levels in wells tapping the same aquifer(s) in the vicinity of tract. Subsidence may disrupt overlying bedrock aquifer(s) in the Fruitland formation by fracturing them. This may affect well yields, water levels and possible water quality in wells tapping those aquifers. Two wells exist within this tract. The quantity or quality of water available to these wells may be affected by subsidence and/or mine dewatering.

Paleontological resource impacts show three recorded sites within the boundaries of the tract. Underground mining activities will not impact these or any related sites within the tract. Above ground activities or facilities will impact these or any potential sites. The destruction of these surface resources could result in the loss of some data with minimal potential for significance. The total acreage which would be disturbed is 80 acres.

Impacts to the range resources would involve the loss of 5 AUM's of forage over the life of the mine from the surface facilities of the underground mine.

As for impacts associated with visual resources this tract is entirely in a Class III management area. Surface facilities involved with an underground mine would not meet the management objectives for this classification.

The impacts for cultural resources involve five sites and seven isolated occurrences which have been recorded within the tract. The known sites and isolated in this tract may be impacted by the above ground activities associated with the subsurface mining.

The American Indian impacts include 8 known Navajo homesites:

a. Two homes on T. 22 N., R. 10 W., Section 2: NW1/4, on Indian allotment.

b. Two homes on T. 22 N., R. 10 W., Section 2: SW1/4, on Indian allotment. Allottees and her children live on this allotment and have not made a response to our consultation letter.

c. Two homes on T. 22 N., R. 10 W., Section 11: NW1/4, on Indian allotment. Allotment owner lives on this and has responded to our consultation where she wants to go on record as having a firm intent not to consent to leasing of coal under her land.

d. Two homes on T. 22 N., R. 10 W., Section 10: NW1/4, on Indian allotment. Owner made known she does not want coal development on her land. She lives on it and uses it for grazing.

The sacred burial sites, herb gathering areas, and offerings have not been specifically identified. Although the Navajo medicine men have stated underground mining is still just like surface mining whereas it is destroying or scarring Mother Earth.

KIMBETO #2 TRACT
FEDERAL OWNERSHIP - SURFACE MINE

The Kimbeto #2 Tract, approximately 640 acres in size, is located 46 miles southeast of Farmington, New Mexico. Land surface and coal within the tract are federally owned. The tract total and unleased coal is an estimated 20 million tons of mineable reserves and 18 million tons of recoverable reserves. The expected production rate would be 1 million tons per year for a projected mine life of 20 years. Total expected revenue from federal coal within the tract is $366 million with an expected federal royalty value of $45.8 million for the life of the mine. Approximately 35 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 640 acres.

Approximately 75 employees would be needed to mine the reserves. The mining activities would require approximately 20 acre feet/year of water from deep wells for mining operations.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling, and reclamation.

Ground water impacts involve destruction of stratified nature of Fruitland formation overburden and all confining layers above the Pictured Cliffs Sandstone. These would be replaced with crumbled shale and sandstone rubble having a greater porosity than the original stratified material. This may result in upward leakage of water from the underlying Pictures Cliffs

Sandstone which contains water of a greater salinity than the water in the Fruitland formation at some locations.

Possible offsite reduction of well yields, lowering of water levels, and changes in water quality in wells tapping the Fruitland formation and Pictured Cliffs Sandstone.

Withdrawal of 20 acre feet per year of ground water from "deep" aquifer(s) for reclamation and dust suppression would alter ground-water flow near the well(s) and may cause a lowering of water levels in wells trapping the same aquifer in vicinity of the tract.

As for surface water impacts the following would occur:

a. Runoff from mined area would be impounded, resulting in an unknown but probably small amount of surface water lost to evaporation.

b. Increase in dissolved and suspended solids concentrations in runoff during reclamation phase until channels stablize.

c. Use of saline or sodic ground water from "deep" aquifers may impact water quality of runoff from reclaimed area.

d. 180 acres of floodplain on Betonnie Tsosie Wash drainage would be disrupted.

The paleontological impacts show a potential estimate that there are significant fossils contained within the overburden comprising Kimbeto Tract #2. This is indicated by the high number of significant fossil sites located in the stratigraphically related Ah-shi-sle-pah Wash. It is estimated that some or possibly all these sites would be destroyed if the proposed action is implemented.

The estimated fossil localities disturbed in the first year is 5. The total acreage disturbed would be 640 acres. While the estimated total number of fossil localities disturbed is 41.

The range resource impacts would include the loss of 138 AUM's of native forage over the life of the mine from surface mining until revegetation occurs.

The visual resources in this tract are in Class III management area. Surface mining of approximately 35 acres per year would not meet the management objectives for this classification.

The impacts for cultural resources involve three sites which have been located within the tract. The largest is a 98 acre quarry/lithic scatter. The known sites and others in the tract during future inventory would be destroyed by mining activities.

NAGEEZI TRACT
MIXED OWNERSHIP - UNDERGROUND MINE

The Nageezi Tract, approximately 13,120 acres in size, is located 34 miles southeast of Farmington, New Mexico. Of the total 13,120 acres for land surface 10,400 acres are Federal, 1,280 acres are State and 1,440 acres are private. The acreages for the coal reserves are 10,560 acres unleased Federal, and 2,560 acres for State.

The tract contains mineable reserves of unleased Federal at 222.3 million tons with the tract total of 273.17 million tons. The recoverable reserves tonnage of unleased Federal is 108.5 million tons with the tract total of 134.2 million tons. The expected production rate would be 1.6 million tons per year for a projected mine life of 67 years. Total expected revenue from federal coal within the tract is $2.71 billion with an expected federal royalty value of $217 million for the life of the mine. A maximum of 80 surface acres would be disturbed over the life of the underground mine for placement of the related surface facilities.

Approximately 400 employees would be needed to mine the reserves. The mining activities would require approximately 35 million gallons per year of water from deep wells for mining operations.

The following impacts may occur to ground water:

1. Subsidence may disrupt overlying bedrock aquifer(s) in the Ojo Alamo Sandstone and Nacimiento Formation for fracturing them. This would affect well yields, water levels and possibly water quality in wells tapping those aquifers.

2. Subsidence may disrupt alluvial aquifer and affect well yields, water levels, and possibly quality in wells tapping those aquifers.

3. Approximately 100 acre-feet per year of ground water from "deep" aquifers(s) for dust suppression and reclamation would alter ground-water flow near the well(s) and could cause a lowering of water levels in wells tapping the same aquifer(s) in the vicinity of tract.

4. Two BLM wells exist within the tract. Both are completed in aquifers overlying the coal beds. The quantity or quality of water available to these wells may be affected by subsidence and/or mine dewatering. Some wells outside the tract could also be affected.

A maximum of 80 acres of native vegetation would be destroyed for surface facilities for the underground mine. The range impacts result in a loss of 4 AUM's over the life of the mine.

The visual resource impacts show the majority of this tract is within a Class III management area while a portion is in a VRM Class IV area. Surface facilities associated with an underground mine would not meet the management objectives for either of these classifications.

The impacts for cultural resources show a portion of the 61 recorded sites and 105 recorded localities, isolated artifacts and current cultural

manifestations in the tract outside of the Pierre's Site and defined in PL 96-550, and other resources recorded during future cultural inventories may be impacted by the above ground activities associated with the subsurface mining.

The Pierre's Ruin Community (Pierre's Site) included in PL 96-550 has been withdrawn from surface disturbance. All of Section 12 and the W1/2 of Section 7 has been nominated to the National Register of Historic places as the Pierre's Archaeological District. Subsidence of the surface due to subsurface mining may occur during or after mining operations.

The American Indian impacts include 6 known Navajo homesites:

a. A large house located on T. 23 N., R. 10 W., Section 8: SE1/4SW1/4.

b. A house on T. 24 N., R. 10 W., Section 34: SW1/4SW1/4 on Indian allotment.

c. Two houses in T. 24 N., R. 10 W., Section 28: NW1/4NE1/4 on Indian allotment.

d. One house with corrals located in T. 24 N., R. 10 W., Section 29: SW1/4NW1/4 on Indian allotment.

e. A new house near the NE1/4 corner of Section 30, T. 24 N., R. 10 W.

These areas are under grazing lease to the Navajo Tribe, under Section 15 of the Taylor Grazing Act.

The sacred burial sites, herb gathering areas, and offerings have not been specifically identified, but the Navajo Medicine men have stated underground mining is still just like surface mining whereas it is destroying or scarring Mother Earth.

GALLO WASH #1 TRACT
MIXED OWNERSHIP - SURFACE MINE

The Gallo Wash #1 Tract, approximately 320 acres in size, is located 38 miles west of Cuba, New Mexico. Of the total 320 acres for land surface 120 acres are unleased Federal, and 200 acres are withdrawn under Public Land Order 2198 for Indian Use. The acreages for the coal reserves are 320 acres unleased Federal.

The tract contains mineable reserves of unleased Federal at 11.0 million tons with the tract total of 11.0 million tons. The recoverable reserves tonnage of unleased Federal is 10.0 million tons with the tract total of 10.0 million tons. The expected production rate would be 2.0 million tons per year for a projected mine life of 7 years. Total expected revenue from federal coal within the tract is $190 million with an expected federal royalty value of $23.8 million for the life of the mine. Approximately 67 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 320 acres.

Approximately 150 employees would be needed to mine the reserves. The mining activities would require approximately 100 acre feet/year of water from deep wells for reclamation and dust control.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling, and reclamation.

Ground water impacts include the following.

a. Destruction of stratified nature of Fruitland formation overburden and all confining layers above the Pictured Cliffs Sandstone. These would be replaced with crumbled shale and sandstone rubble having a greater porosity than the original stratified material. This may result in upward leakage from the underlying Pictured Cliffs Sandstone which contains water of a much greater salinity than the water in the Fruitland formation at some locations.

b. Possible withdrawal of 100 acre feet per year of ground water from "deep" aquifer(s) for reclamation and dust suppression would alter ground water flow near the well(s) and may cause a lowering of water levels in wells tapping the same aquifer in the vicinity of the tract.

Paleontological resource impacts show that there are approximately 9 recorded fossil sites located within or immediately adjacent to the Gallo Wash #1 (Bypass) tract. It is estimated that there are, potentially, at least 20 more fossil sites not recorded. Some or all of these sites would be destroyed during mining operations. The disruption and rearrangement of fossils from their original position in the strata will destroy associations of fossils and hinder taxanomic and paleontological studies. Removal or disturbance of fossils will likewise preclude biostratigraphic studies based on successions of species or assemblages.

The estimated fossil localities disturbed in the first year would be 10. The total acreage disturbed will be 420 acres. While the estimated total number of fossil localities disturbed would be 41.

Impacts to the range resources would involve the loss of 38 AUM's of forage over the life of the mine until reclamation is effective.

The visual resources in this tract are in Class III management area while a portion is in a VRM Class IV area. Surface mining would not meet the management objectives for either of these classifications.

The American Indian impacts show burial sites, herb gathering areas, sacred or offering points have not been identified. If any are identified, they would be impacted by surface mining which would violate the American Indian Religious Freedom Act PL-341.

As for any recreational impacts surface mining activities on Gallo Wash #1 could disrupt the Continental Divide National Scenic Trail location.

GALLO WASH #2 TRACT
MIXED OWNERSHIP - UNDERGROUND MINE

The Gallo Wash #2 Tract, approximately 1,680 acres in size, is located 40 miles west of Cuba, New Mexico. Of the total 1,680 acres for land surface 600 acres are unleased Federal, 880 acres are State and 200 acres are private. The acreages for the coal reserves are 760 acres unleased Federal, 720 acres for State and 200 acres for private.

The tract contains mineable reserves of unleased Federal at 17.1 million tons with the tract total of 36.6 million tons. The recoverable reserves tonnage of unleased Federal is 9 million tons with the tract total of 18.3 million tons. The expected production rate would be 1.0 million tons per year for a projected mine life of 12 years. Total expected revenue from federal coal within the tract is $215 million with an expected federal royalty value of $17.2 million for the life of the mine. A maximum of 80 surface acres would be disturbed over the life of the underground mine for placement of the related surface facilities.

Approximately 250 employees would be needed to mine the reserves. The mining activities would require approximately 23 million gallons of water per year from deep wells for mining operations.

Ground water impacts include the following:

a. Subsidence might disrupt overlying bedrock aquifers in the Ojo Alamo Sandstone by fracturing, and affect potential local ground water supplies from this aquifer.

b. Subsidence might disrupt alluvial aquifer and affect potential local supplies of shallow ground water.

c. Seepage of water from the underlying Pictured Cliffs Sandstone into the mine might affect the yield and water level of one well completed in this aquifer about one mile west of the tract.

Paleontological resource impacts show that there is one recorded fossil site in Gallo Wash #2 tract located in T. 21 N., R. 8 W., Section 2: SW1/4SW1/4. However there will be no significant impact. There would be a total of 80 acres disturbed in this tract.

Impacts to the range resources would involve the loss of 7 AUM's of forage over the life of the mine from the surface facilities of the underground mine. Two reservoirs and one cattleguard may be destroyed by location of surface facilities.

The cultural resources impacts indicated two isolated artifacts and no sites recorded in the portions of the tract containing Federal coal or surface. Sites may be destroyed by surface activities associated with

subsurface mining. The American Indian impacts include 6 known Navajo dwellings: three homes on the NW1/4, Section 11, T. 21 N., R. 8 W., on public land which is being considered in the Navajo Land Exchange. Three homes on the NE1/4, Section 10, T. 21 N., R. 8 W., on public land which is being considered in the Navajo Land Exchange. Three of these homes may be on the dividing line between tracts 2 and 3.

BISTI #6/8 TRACT
MIXED OWNERSHIP - SURFACE MINE

The Bisti #6/8 Tract, approximately 520 acres in size, is located 31 miles south of Farmington, New Mexico. The total 520 acres of land surface, 240 acres are Federal and 280 are private. The acreages for the coal reserves are 520 acres unleased Federal.

The tract contains mineable reserves of unleased Federal at 1.0 million tons with the tract total of 1.0 million tons. The recoverable reserves tonnage of unleased Federal is 1.0 million tons with the tract total of 1.0 million tons. The expected production rate would be .25 million tons per year for a projected mine life of 4 years. Total expected revenue from federal coal within the tract is $18.2 million with an expected federal royalty value of $2.30 million for the life of the mine. Approximately 63 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 110 acres.

Approximately 20 employees would be needed to mine the reserves. The mining activities would require approximately 40 acre feet/year of water from deep wells for reclamation and dust control.

Air quality impacts show the estimated maximum off-site total suspended particulate (TSP) would be 25 micro grams per cubic meter (ug/m^3). Background air quality in the area is estimated at (30 ug/m^3). This would give a total of 55 ug/m^3 compared to the annual New Mexico standard of 60 ug/m^3. The air quality could exceed the annual New Mexico standard if operational procedures are not instituted.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden, removal, stockpiling, and reclamation.

Ground water impacts include the following:

a. Destruction of stratified nature of Fruitland formation overburden and all confining layers above the Pictured Cliffs Sandstone. These would be replaced with crumbled shale and sandstone rubble having a greater porosity than the original stratified material. This may result in upward leakage from the underlying Pictured Cliffs Sandstone which contains water of a much greater salinity than the water in the Fruitland formation at some locations.

b. Local destruction of potential shallow sources of ground water as mining proceeds through alluvial channels.

c. Less runoff locally to alluvial channels downstream during mining and after reclamation, with possibly less recharge to ground water in the alluvium.

The paleontological resource impacts show an estimated 5 fossil localities disturbed in the first year. The total of 110 acres would be disturbed. While the estimated total number of fossil localities disturbed would be 33. There are thirteen recorded fossil sites within Bisti Tract #8 in T. 23 N., R. 13 W., Section 6: NW1/4, NE1/4 and SE1/4SE1/4. None of these sites are considered significant, however, potential importance remains high due to the stratigraph relationship of this area with the Bisti Badlands area. Implementation of the Proposed Action could lead to the destruction of some or all of the fossil-collecting sites in this area.

Impacts to the range resources would involve the loss of 20 AUM's of forage over the life of the mine. While drainage to one reservoir south of the tract in Section 15 would be destroyed.

The visual resource impacts in this tract are in Class III and IV management area. Surface mining would not meet the management objectives for this classification and would destroy topography and scenic features to fragile badlands and the visual quality to the adjacent Bisti/De-na-zin ACEC (proposed).

The impacts for cultural resources involve two Navajo graves from an unknown date and two cultural resources sites occur in the tract. Sites in the tract would be destroyed by mining activities.

The American Indian impacts include 2 known Navajo dwellings:

One home on NE1/4, Section 15, T. 23 N., R. 13 W., on Indian allotted land.

One home on NW1/4, Section 17, T. 23 N., R. 13 W., on Indian allotted land.

These homes would be destroyed if mining occurs.

These areas are under grazing lease to the Navajo Tribe under Section 15 of the Taylor Grazing Act. Each permittee is paying by the acre to graze these lands.

There are also two sacred burial sites on the NW1/4 corner of Section 15, T. 23 N., R. 13 W., and there may be others.

The recreation impacts on this tract shows that surface facilities and mining could destroy topographic and scenic features. This area has been recognized as having high quality scenic resources and has been particularly noted for its geologic sightseeing values.

The wilderness impacts shows that sights and sounds associated with the adjacent surface mining of Bisti 6/8 could disrupt the naturalness and opportunities for solitude in the Bisti WSA.

LEE RANCH EAST TRACT
MIXED OWNERSHIP - SURFACE MINE

The Lee Ranch East Tract, approximately 1,817 acres in size, is located 30 miles northeast of Grants, New Mexico. The total 1,817 acres of land surface are private. The acreages for the coal reserves are 969 acres unleased Federal, and 848 acres for private.

The tract contains mineable reserves of unleased Federal at 16.0 million tons with the tract total of 38.0 million tons. The recoverable reserves tonnage of unleased Federal is 14.0 million tons with the tract total of 33.0 million tons. The expected production rate would be 800,000 tons per year for a projected mine life of 42 years. Total expected revenue from federal coal within the tract is $272 million with an expected federal royalty value of $34 million for the life of the mine. Approximately 24 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 969 acres.

Approximately 60 employees would be needed to mine the reserves. The mining activities would require approximately 38 acre feet/year of water from deep wells for reclamation and dust control.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling, and reclamation.

Ground water impacts include the following:

a. Destruction of stratified nature of Menefee formation (Cleary Coal Member) and all confining layers above the Point Lookout Sandstone. These would be replaced with crumbled shale and sandstone rubble having a greater porosity than the original stratified material. This may result in upward leakage of water from the underlying Point Lookout Sandstone, which may contain water of a much greater salinity than the water in the Menefee formation at some locations.

b The coal deposits of this area are also the major aquifers tapped by wells in the area. Offsite reduction of spring and well yields, lowering of water levels, and changes in water quality in wells tapping the Menefee formation and Point Lookout Sandstone would result.

c. One flowing well and two springs exist within the tract. If these are located in areas to be mined they would be destroyed.

The paleontological resource shows no survey data for this tract. However, 1,019 total acres would be disturbed.

Impacts to the range resources would involve the temporary loss of 255 AUM's of native forage over the life of the mine.

As for any recreational impacts, surface mining activities on Lee Ranch East could disrupt the Continental Divide National Scenic Trail location.

No cultural resources are known to have been recorded. However, fourteen sections have been inventoried for cultural resources within or adjacent to the Lee Ranch tracts. If similar site densities occur in the parcels of this tract it is predicted there may be between 10 and 35 sites.

LEE RANCH MIDDLE TRACT
MIXED OWNERSHIP - SURFACE MINE

The Lee Ranch Middle Tract, approximately 14,384 acres in size, is located 25 miles Northwest of Grants, New Mexico. Of the total 14,384 acres for land surface 1,120 acres are State and 13,264 acres are private. The acreages for the coal reserves are 4,744 acres unleased Federal, 1,120 acres for State and 8,520 acres for private.

The tract contains mineable reserves of unleased Federal at 86.0 million tons with the tract total of 240.0 million tons. The recoverable reserves tonnage of unleased Federal is 73.0 million tons with the tract total of 204.0 million tons. The expected production rate would be 5.1 million tons per year for a projected mine life of 42 years. Total expected revenue from federal coal within the tract is $1,469 million with an expected federal royalty value of $182.5 million for the life of the mine. Approximately 148 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 5,904 acres.

Approximately 382 employees would be needed to mine the reserves. The mining activities would require approximately 1,000 acre feet/year of water from deep wells for reclamation and dust control.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling, and reclamation.

The air quality impacts show the estimated maximum off-site total suspended particulates (TSP) would be 29 micrograms per cubic meter (ug/m3). Background air quality in the area is estimated at (30 ug/m3). This would give a total of 59 ug/m3 compared to the annual New Mexico standard of 60 ug/m3. The Lee Ranch Mine currently has a PSD exemption from the Environmental Protection Agency because of emission control measures that will be completed.

Ground water impacts include the following:

a. Destruction of stratified nature of Menefee formation (Cleary Coal Member) and all confining layers above the Point Lookout Sandstone. These would be replaced with crumbled shale and sandstone rubble having a greater porosity than the original stratified material. This may result in upward leakage of water from the underlying Point Lookout Sandstone, which may contain water of a much greater salinity than the water in the Menefee formation at some location.

b. The coal deposits of this area are also the major aquifers tapped by stock wells in the area. Offsite reduction of well yields, lowering of water levels, and changes in water quality in wells tapping the Menefee formation and Point Lookout Sandstone would result.

c. Offsite reduction of spring yields and water quality would occur.

d. 5 wells (4 flow) and approximately 10 springs exist within the tract. If these are located in areas to be mined they would be destroyed.

The paleontological resource impacts show that there are two recorded fossil sites known in the study area. One of these sites is considered to be significant. It is located in the NW1/4SE1/4NE1/4 of Section 35: T. 15 N., R. 8 W. This site contains a diverse and well preserved assemblage of plant fossils of the Menefee formation. There is approximately 6,104 total acres that would be disturbed.

Impacts to the range resources would involve the temporary loss of 1,606 AUM's of native forage over the life of the mine.

The cultural resource impacts indicate six sites that have been recorded within the tract parcels containing Federal coal. Fourteen sections have been inventoried for cultural resources within or adjacent to the Lee Ranch tracts. If similar densities occur in the parcels containing Federal coal of this tract it is predicted there may be between 32 and 43 sites.

As for any recreational impacts, surface mining activities on Lee Ranch Middle could disrupt the Continental Divide National Scenic Trail location.

LEE RANCH WEST TRACT
MIXED OWNERSHIP - SURFACE MINE

The Lee Ranch West Tract, approximately 13,051 acres in size, is located 30 miles Northwest of Grants, New Mexico. Of the total 13,051 acres for land surface 160 acres are unleased Federal, 1,120 acres are State and 11,771 acres are private. The acreages for the coal reserves are 5,770 acres unleased Federal, 1,120 acres for State and 6,161 acres for private.

The tract contains mineable reserves of unleased Federal at 101.0 million tons with the tract total of 238.0 million tons. The recoverable

reserves tonnage of unleased Federal is 86.0 million tons with the tract total of 202.0 million tons. The expected production rate would be 5.0 million tons per year for a projected mine life of 25 years. Total expected revenue from federal coal within the tract is $1,717 million with an expected federal royalty value of $214.625 million for the life of the mine. Approximately 188 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 7,539 acres.

Approximately 375 employees would be needed to mine the reserves. The mining activities would require approximately 1,000 acre feet/year of water from deep wells for reclamation and dust control.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling, and reclamation.

The air quality impacts show the estimated maximum off-site total suspended particulates (TSP) would be 29 micrograms per cubic meter (ug/m3). Background air quality in the area is estimated at (30 ug/m3). This would give a total of 59 ug/m3 compared to the annual New Mexico standard of 60 ug/m3. The air quality could exceed the annual New Mexico standard if operational procedures are not instituted.

The ground water impacts include the following:

a. Destruction of stratified nature of Menefee formation (Cleary Coal Member) and all confining layers above the Point Lookout Sandstone. These would be replaced with crumbled shale and sandstone rubble having a greater porosity than the original stratified material. This may result in upward leakage of water from the underlying Point Lookout Sandstone, which may contain water of a much greater salinity than the water in the Menefee formation at some locations.

b. The coal deposits of this area are also the major aquifers tapped by stock wells in the area. Offsite reduction of well yields, lowering of water levels, and changes in water quality in wells tapping the Menefee formation and Point Lookout Sandstone would result.

c. Offsite reduction of spring yields and water quality would occur.

d. Three wells exist within the tract; one of these is a flowing well. If these are located in areas to be mined they would be destroyed.

The paleontological resource impacts show that there are two recorded fossil sites known in the study area. One of these sites is considered to be significant. It is located in the NW1/4SE1/4NE1/4 of Section 35: T. 15 N., R. 8 W. This site contains a diverse and well preserved assemblage of plant fossils of the Menefee formation. There are approximately 7,739 total acres that would be disturbed.

Impacts to the range resources would involve the loss of 1935 AUM's of native forage over the life of the mine.

The cultural resource impacts indicate twenty seven sites have been recorded within the tract parcels containing Federal coal. Also recorded are several segements of the Chacoan Roadway system. Fourteen sections have been inventoried for cultural resources within or adjacent to the Lee Ranch tracts. If similar site densities occur in the parcels containing Federal coal of this tract it is predicted there may be between 70 and 100 sites.

As for any recreational impacts, surface mining on Lee Ranch West could disrupt the Continental Divide National Scenic Trail location.

DIVIDE TRACT
MIXED OWNERSHIP - SURFACE MINE

The Divide Tract, approximately 6,889 acres in size, is located 30 miles North of Grants, New Mexico. Of the total 6,889 acres for land surface, 400 acres are unleased Federal, 640 acres are State and 5,849 acres are private. The acreages for the coal reserves are 3,031 acres unleased Federal, 640 acres for State and 3,218 acres for private.

The tract contains mineable reserves of unleased Federal at 16.0 million tons with the tract total of 43.0 million tons. The recoverable reserves tonnage of unleased Federal is 14.0 million tons with the tract total of 37.0 million tons. The expected production rate would be 1.0 million tons per year for a projected mine life of 42 years. Total expected revenue from federal coal within the tract is $272 million with an expected federal royalty value of $34 million for the life of the mine. Approximately 75 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 3,000 acres.

Approximately 75 employees would be needed to mine the reserves. The mining activities would require approximately 50 acre feet/year of water from deep wells for reclamation and dust control.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling, and reclamation.

The ground water impacts include the following:

a. Destruction of stratified nature of Gibson Coal Member of the Crevasse Canyon formation overburden and all confining layers above the Dalton Sandstone Member of the Crevasse Canyon formation. These would be replaced with crumbled shale and sandstone rubble having a greater porosity than the original stratified material. This may result in upward leakage of water from the underlying Dalton Sandstone Member which may contain water of a much greater salinity than the water in the Gibson Coal Member at some locations.

b. Possible offsite reduction of stock well yields, lowering of water levels, and changes in water quality in wells tapping the Dalton Sandstone Member.

c. One well exists within the tract. This well is owned by the Navajo Tribe. If it is located in an area to be mined it would be destroyed. If not located in an area to be mined, the yield and water level would likely be affected by wells drilled into the Gallup Sandstone for reclamation water.

The paleontological resource impacts show that there several recorded fossil sites on the tract, five of which are are considered significant. These are located in T. 16 N., R. 10 W., Section 36: NE1/4SE1/4; Section 25: SE1/4SW1/4; Section 23: NW1/4SE1/4, and SW1/4NE1/4; Section 2: NE1/4SW1/4NE1/4; Section 1: NE1/4NE1/4SW1/4. There are approximately 3,100 total acres that would be destroyed.

Impacts to the range resources would involve the loss of 282 AUM's of native forage over the life of the mine.

The cultural resource impacts indicate five sites have been recorded in portions of the tract containing Federal coal or surface. Cultural resource inventories have been conducted to the north, west, and east. If similar site densities ocurr across this tract it is predicted there may be between 48 and 105 sites.

Recreational impacts show that the Continental Divide passes close by this tract. Surface mining would have a serious aesthetic impact upon the Continental Divide National Scenic Trail if it is routed through this area.

The American Indian impacts include 3 known Navajo dwellings: three homes on the NW1/4, Section 4, T. 15 N., R. 10 W., on Indian allotted land.

HOSPAH #1 TRACT
MIXED OWNERSHIP - SURFACE MINE

The Hospah #1 Tract, approximately 17,960 acres in size, is located 30 miles north of Grants, New Mexico. Of the total 17,960 acres for land surface 2,080 acres are State and 15,880 acres are private. The acreages for the coal reserves are 1,600 acres unleased Federal, 1,920 acres for State and 14,440 acres for private.

The tract contains mineable reserves of unleased Federal at 22.0 million tons with the tract total of 218 million tons. The recoverable reserves tonnage of unleased Federal is 19.0 million tons with the tract total of 186 million tons. The expected production rate would be 10.3 million tons per year for a projected mine life of 20 years. Total expected revenue from federal coal within the tract is $374 million with an expected federal royalty value of $46.8 million for the life of the mine. Approximately 80 surface acres would be disturbed annually for unleased Federal coal. Surface disturbance over the life of the mine would total 1,440 acr

Approximately 75 employees would be needed to mine the reserves. The mining activities would require approximately 60 acre feet/year of water from deep wells for reclamation and dust control.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling, and reclamation.

The ground water impacts include the following:

a. Destruction of stratified nature of Cleary Coal Member of Menefee formation overburden and all confining layers above the Point Lookout Sandstone. These would be replaced with crumbled shale and sandstone rubble having greater porosity than the original stratified material. This could result in upward leakage of water from the underlying Point Lookout Sandstone, which may contain water of a greater salinity than the water in the Menefee formation in this vicinity.

b. Possible offsite reduction of well yields, lowering of water levels, and changes in water quality in wells tapping the Menefee formation and Point Lookout Sandstone.

c. Four known wells exist within the tract. Three of these are completed in the Point Lookout Sandstone and/or Menefee formation. The other well taps deeper aquifers. Any wells located in areas to be mined would be destroyed, regardless of the aquifer tapped.

The paleontological resource impacts indicate through reconnaisance reports the presence of potentially fossiliferous outcrops throughout the Hospah Tract. However, no significant impacts have been found. The total acres disturbed in the area would be 80.

Impacts to the range resources would involve the loss of 173 AUM's of native forage over the life of the mine.

The cultural resource impacts indicate four sites have been recorded in the portions of the tract with Federal minerals. A portion of a Chacoan Roadway crosses the tract. The South Hospah mine survey found an average site density of 13 sites per section. If a similar site density occurs in the portions of the tract with Federal minerals it is predicted there may be approximately 33 sites.

Recreational impacts show that the Continenal Divide passes through this tract. Mining and associated surface facilities could have an aesthetic impact upon the Continental Divide National Scenic Trail if it is routed through here.

HOSPAH #2 TRACT
MIXED OWNERSHIP - UNDERGROUND MINE

The Hospah #2 Tract, approximately 3,160 acres in size, is located 30 miles north of Grants, New Mexico. Of the total 3,160 acres for land surface 640 acres are State and 2,520 acres are private. The acreages for the coal reserves are 640 acres unleased Federal, and 2,520 acres for private.

The tract contains mineable reserves of unleased Federal at 10 million tons with the tract total of 59 million tons. The recoverable reserves tonnage of unleased Federal is 5 million tons with the tract total of 30 million tons. The expected production rate would be 2.9 million tons per year for a projected mine life of 13 years. Total expected revenue from federal coal within the tract is $125 million with an expected federal royalty value of $1 million for the life of the mine. A maximum of 80 surface acres would be disturbed over the life of the underground mine for placement of the related surface facilities.

Approximately 125 employees would be needed to mine the reserves. The mining activities would require approximately 40 acre feet/year of water from deep wells for mining operations.

The ground water impacts include the following:

a. Subsidence might disrupt overlying bedrock aquifer(s) in the Menefee formation by fracturing them. This could affect well yields, water levels, and possibly water quality in wells tapping this aquifer in the vicinity of the tract.

Paleontological resources show that there is not expected to be any direct impact on potential fossil material from underground mining, however, there could be negative indirect impact from related activities and facilities on the surface. There would be a total of 80 acres disturbed in this tract.

Impacts to the range resources would involve the loss of 9 AUM's of forage over the life of the mine on the surface facilities of the underground mine.

Recreational impacts show that the Continental Divide passes through this tract. Mining and associated surface facilities could have an aesthetic impact upon the Continental Divide National Scenic Trail if it is routed through here.

The cultural resource impacts show that one site has been recorded in the portion of the tract with Federal minerals. The South Hospah mine survey found an average site density of 13 sites per section. If a similar density occurs in the section of Federal minerals it is predicted there may be approximately 13 sites.

GAMERCO #1 (BYPASS) HC TRACT
MIXED OWNERSHIP - SURFACE MINE

The Gamerco #1 (Bypass) HC Tract, approximately 440 acres in size, is located 9 miles northwest of Gallup, New Mexico. The total 440 acres of land surface are private. The acreages for the coal reserves are 360 acres unleased Federal and 80 acres of private.

The tract contains mineable reserves of unleased Federal at 3.0 million tons with the tract total of 4.0 million tons. The recoverable reserves tonnage of unleased Federal is 3.0 million tons with the tract total

of 4.0 million tons. The expected production rate would be 140,000 tons per year for a projected mine life of 22 years. Total expected revenue from federal coal within the tract is $56 million with an expected federal royalty value of $7 million for the life of the mine. Approximately 8 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 150 acres.

Approximately 11 employees would be needed to mine the reserves. The mining activities would require approximately 15 acre feet/year of water from deep wells for reclamation and dust control.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling, and reclamation.

The ground water impacts include the following:

a. Destruction of stratified nature of Crevasse Canyon formation overburden and all confining layers above the Gallup Sandstone. These would be replaced with crumbled shale and sandstone rubble having a greater porosity than the original stratified material. This may result in downward leakage of water from the overlying Crevasse Canyon formation which may contain water of a greater salinity than the water in the Gallup Sandstone at this location.

b. Possible offsite reduction of well yields, lowering of water levels, and changes in water quality in wells tapping the Menefee formation, Crevasse Canyon formation and Gallup Sandstone.

The paleontological resources show that there is potential for the presence of fossiliferous exposures containing important fossils. However, there is no survey data to date. The estimated total acreage disturbed would be 125.

Impacts to the range resources would involve the loss of 23 AUM's of native forage over the life of the mine.

The American Indian impacts include 2 known Navajo dwellings: Two homes on SW1/4, Section 34: T. 16 N., R. 19 W., on Indian allotment.

BISTI #4 TRACT
MIXED OWNERSHIP - SURFACE MINE

The Bisti #4 Tract, approximately 2,680 acres in size, is located 52 miles southeast of Farmington, New Mexico. Of the total 2,680 acres for land surface 1,040 acres are unleased Federal, 80 acres are State and 1,560 acres are private (E.O. 1483 - 200 Acres). The acreages for the coal reserves are 2,600 acres unleased Federal, and 80 acres for State.

The tract contains mineable reserves and resources of unleased Federal at 35 million tons with the tract total of 36.0 million tons. The recoverable reserves and resources tonnage of unleased Federal is 30.0 million tons with the tract total of 30.0 million tons. The expected production rate would be 1.0 million tons per year for a projected mine life of 32 years. Total expected revenue from federal coal within the tract is $592 million with an expected federal royalty value of $74 million for the life of the mine. Approximately 60 surface acres would be disturbed annually for unleased Federal coal. Surface disturbance over the life of the mine would total 1,900 acres for unleased Federal Coal.

Approximately 75 employees would be needed to mine the reserves. The mining activities would require approximately 35 acre feet/year from deep wells for reclamation and dust control.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden, removal, stockpiling, and reclamation.

The ground water impacts include the following:

a. Destruction of stratified nature of Fruitland formation overburden and all confining layers above the Pictured Cliffs Sandstone. These would be replaced with crumbled shale and sandstone rubble having a greater porosity than the original stratified material. This may result in upward leakage from the underlying Pictured Cliffs Sandstone which contains water of a much greater salinity than the water in the Fruitland formation at some locations.

b. Possible offsite reduction of well yields, lowering of water levels, and changes in water quality in wells tapping the Cliff House Sandstone.

The paleontological resources show that there are 15 recorded fossil sites located within this tract. They are located in T. 23 N., R. 12 W., Section 26: S1/2S1/2, Section 35: N1/2N1/2. Most of these sites and the exposures in Section 34: NE1/4 contain potentially significant fossils. The estimated fossil localities disturbed in the first year would be 10. The total acreage figure will be 3,504. While the estimated total number of fossil localities disturbed would be 120.

Impacts to the range resources would involve the temporary loss of 134 AUM's of native forage. While one reservoir and one reservoir drainage would be destroyed over the life of the mine.

The cultural resource impacts show that one locality has been recorded. However, no sites have been recorded in this tract.

Recreational impacts show that this tract is in an area which contains high quality opportunities for geological sightseeing. Many types of fossils can be found here. Surface mining would destroy the sightseeing opportunities here.

The wildlife impacts indicate that there is an active (1981) ferruginous hawk nest (Unsuitability Criteria #14) in Bisti #4B, T. 23 N., R. 12 W., Section 35. However a buffer zone decided on by BLM and USFWS (5-24-81) takes in 25 acres of Section 35: NW1/4NW1/4 which is part of Bisti #4A.

Another active ferruginous hawk nest (Unsuitability Criteria #14) is located in T. 23 N., R. 12 W., Section 35: SW1/4NW1/4. A buffer zone agreed upon by BLM and USFWS (6-24-81) encompasses approximately 20 acres in Section 34: SE1/4NE1/4 and 70 acres in Section 35: NW1/4

The following American Indian sacred areas have been identified:

a. NW1/4NW1/4, Section 35, and N1/2N1/2, Section 34 have been designated as areas of herb gatherings in the MFP. The S1/2S1/2 of Section 26 should be included as herbs usually grow around higher areas.

b. The S1/2N1/2 of Section 34 and SW1/4NW1/4, E1/2NW1/4, NE1/4, Section 35 have been designated to be a herb gathering area in the MFP.

JOHNSON TRADING POST TRACT
MIXED OWNERSHIP - SURFACE MINE

The Johnson Trading Post Tract, approximately 3,440 acres in size, is located 15 miles southwest of Cuba, New Mexico. Of the total 3,440 acres for land surface 2,480 acres are unleased Federal and 960 acres are private. The acreages for the coal reserves are 2,720 acres unleased Federal 720 acres for private.

The tract contains mineable reserves of unleased Federal at 17.0 million tons with the tract total of 18.0 million tons. The recoverable reserves tonnage of unleased Federal is 14.0 million tons with the tract total of 16.0 million tons. The expected production rate would be .40 million tons per year for a projected mine life of 42 years. Total expected revenue from federal coal within the tract is $280 million with an expected federal royalty value of $35 million for the life of the mine. Approximately 86 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 3,440 acres.

Approximately 30 employees would be needed to mine the reserves. The mining activities would require approximately 60 acre feet/year from deep wells for reclamation and dust control.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden, removal, stockpiling, and reclamation.

The ground water impacts include the following:

a. Destruction of stratified nature of Fruitland formation overburden and all confining layers above the Pictured Cliffs Sandstone. Thesewould be replaced with crumbled shale and sandstone rubble having a greater porosity than the original stratified material. This may result in upward leakage from the underlying Pictured Cliffs Sandstone which contains water of a much greater salinity than the water in the Fruitland formation at some locations.

b. Four known wells exist within the tract. Any of these located in areas to be mined would be destroyed, regardless of the producing aquifer. Yields, water levels, and water quality of wells tapping the Quaternary alluvium and Pictured Cliffs Sandstone, but not in mined areas may be affected.

Paleontological material would be adversely impacted in Section 1, T. 20 N., R. 4 W., and the N1/2, NE1/4, Section 11. There are six documented fosssil sites within or immediately adjacent to the leasing boundary. The estimated fossil localities disturbed in the first year would be 11. The total acreage figure will be 3,504. While the estimated total number of fossil localities disturbed would be 317.

Impacts to the range resources would involve the loss of 328 AUM's of native forage over the life of the mine. A drainage area of one reservoir would be cut off.

Major wildlife impacts include one active golden eagle nest which is located in the north part of the tract; T. 19 N., R. 4 W., Section 1. Unsuitability Criteria #11 would apply in this area. Destruction of the spring in T. 19 N., R. 4 W., Section 1 would displace long-eared owls roosting at the spring. The spring would also provide habitat for migratory non-game birds and this habitat would be lost with surface mining. Critical time for spring-time migrants would be April 15 through June 15 when heaviest concentrations of birds would occur.

Most of this tract is within a visual resource Class III management area while a portion is in a VRM Class IV area. Surface mining would not meet the managment objectives for either of these classifications.

The cultural resource impacts show that one site has been recorded in the portions of the tract containing Federal coal or surface.

The American Indian impacts include 8 known Navajo dwellings:

a. One home located on the NE1/4, Section 9, T. 19 N., R. 4 W., on public land, its on the outside edge or on the line of Navajo Land Exchange.

b. Seven homes located on the NW1/4, Section 7, T. 19 N., R. 3 W., on Indian allotted lands.

STAR LAKE EAST #1 TRACT
MIXED OWNERSHIP - SURFACE MINE

The Star Lake East #1 Tract, approximately 2,000 acres in size, is located 22 miles southwest of Cuba, New Mexico. Of the total 2,000 acres for land surface 1,364 acres are unleased Federal, 80 acres are State and 556 acres are private. The acreages for the coal reserves are 1,840 acres unleased Federal, 80 acres for State and 80 acres for private.

The tract contains mineable reserves of unleased Federal at 61.0 million tons with the tract total of 67.0 million tons. The recoverable reserves tonnage of unleased Federal is 52.0 million tons with the tract total of 57.0 million tons. The expected production rate would be 2.0 million tons per year for a projected mine life of 32 years. Total expected revenue from federal coal within the tract is $1.03 billion with an expected federal royalty value of $128.8 million for the life of the mine. Approximately 70 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 2,040 acres.

Approximately 150 employees would be needed to mine the reserves. The mining activities would require approximately 100 acre feet/year of water from deep wells for reclamation and dust control.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden, removal, stockpiling, and reclamation.

The ground water impacts include the following:

a. Destruction of stratified nature of Fruitland formation overburden and all confining layers above the Pictured Cliffs Sandstone. Thesewould be replaced with crumbled shale and sandstone rubble having a greater porosity than the original stratified material. This may result in upward leakage from the underlying Pictured Cliffs Sandstone which contains water of a much greater salinity than the water in the Fruitland formation at some locations.
b. Possible offsite reduction of well yields, lowering of water levels, and changes in water quality in wells tapping the Quaternary alluvium, Fruitland formation, and Pictured Cliffs Sandstone.

The Paleontological resources show that there are six documented fossil sites within the boundaries of Star Lake East #1, all are considered low significance except locality BUNM-77-898. Due to the fossiliferous nature of Kirtland/Fruitland outcrops in this tract it is estimated that 60 potentially significant fossil sites would be destroyed during mining operations. The estimated fossil localities disturbed in the first year would be 10. The total acreage figure will be 2,140. While the estimated total number of fossil localities disturbed would be 248.

Impacts to the range resources would involve the loss of 214 AUM's of native forage over the life of the mine.

Recreational impacts show that the Continental Divide passes through this tract. Mining and associated surface facilities could have an aesthetic impact upon the Continental Divide National Scenic Trail if it is routed through here.

This tract is in a visual resource Class III management area. Surface mining of approximately 70 acres per year would not meet the management objectives for this classification.

The cultural resource impacts show that three sites have been recorded in this tract. It is estimated that there may be between 17 and 35 additional sites.

The American Indian impacts include 11 known Navajo dwellings:

a. Six homes on the NW1/4NW1/4, Section 35 T. 20 N., R. 5 W., all on Indian allotted land. Land owners are not known and no consultation on this newly added portion.

b. Two homes on the NW1/4, Section 34, T. 20 N., R. 5 W., on public land proposed for Navajo Land Exchange.

c. One home on SE corner of SE1/4, Section 33, T. 20 N., R. 5 W., on public land.

d. Two homes on the NE1/4, Section 5, T. 19 N., R. 5 W., on public land.

BISTI #1 TRACT
MIXED OWNERSHIP - SURFACE MINE

The Bisti #1 Tract, approximately 3,713 acres in size, is located 35 miles southeast of Farmington, New Mexico. Of the total 3,713 acres for land surface approximately 2,933 acres are unleased Federal, approximately 342 acres are State and approximately 438 acres are private. The acreages for the coal reserves are 3,713 acres unleased Federal.

The tract contains mineable reserves of unleased Federal at 150.0 million tons with the tract total of 150 million tons. The recoverable reserves tonnage of unleased Federal is 127 million tons with the tract total of 127 million tons. The expected production rate would be 3.2 million tons per year for a projected mine life of 42 years. Total expected revenue from federal coal within the tract is $2.54 billion with an expected federal royalty value of $318 million for the life of the mine. Approximately 89 surface acres would be disturbed annually for unleased Federal coal. Surface disturbance over the life of the mine would total approximately 3,713 acres for unleased Federal Coal.

Approximately 240 employees would be needed to mine the reserves. The mining activities would require approximately 200 acre feet/year of water from deep wells for reclamation and dust control.

Impacts to ground water would result from destruction of the stratified nature of the Fruitland formation overburden and layers above the Pictured Cliff Sandstone. These would be replaced with crumbled shale and sandstone rubble of a greater porosity. This may result in upward leakage from the underlying Pictured Cliffs Sandstone which contains water of a much greater salinity. There is also a possibility of a lowering of water levels in wells tapping the same aquifers in the vicinity of the tract.

Paleontological resources would be impacted by the disturbance of an estimated 290 fossil localities.

Five cultural resource sites and 43 predicted sites would be destroyed by mining activities.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling and reclamation.

Three grazing allotments would be impacted by mining operations. Surface disturbance would cause a loss of 377 AUM's of native forage over the life of the mine. Livestock improvements that would be impacted (destroyed) during mining operations include 1 water well and 3 reservoirs.

BISTI #2 TRACT
MIXED OWNERSHIP - SURFACE MINE

The Bisti #2 Tract, approximately 1,130 acres in size, is located 30 miles south of Farmington, New Mexico. Of the total 1,130 acres for land surface 390 acres are unleased Federal, and 740 acres are private. The acreages for the coal reserves are 1,130 acres unleased Federal.

The tract contains mineable reserves of unleased Federal at 64 million tons with the tract total of 64 million tons. The recoverable reserves tonnage of unleased Federal is 54 million tons with the tract total of 54 million tons. The expected production rate would be 1.5 million tons per year for a projected mine life of 38 years. Total expected revenue from federal coal within the tract is $1.1 billion with an expected federal royalty value of $137.5 million for the life of the mine. Approximately 32 surface acres would be disturbed annually for unleased Federal coal. Surface disturbance over the life of the mine would total 1,130 acres for unleased Federal Coal.

Approximately 115 employees would be needed to mine the reserves. The mining activities would require approximately 20 acre feet/year of water from deep wells for reclamation and dust control.

Impacts to ground water would result from destruction of the stratified nature of the Fruitland formation overburden and all confining layers above the Pictured Cliffs Sandstone. These would be replaced with crumbled shale and sandstone rubble of a greater porosity. This may result in upward leakage from the underlying Pictured Cliffs Sandstone which contains water of a much greater salinity. There is also a possibility of a lowering of the water level in wells tapping the same aquifers in the vicinity of the tract. There would be less runoff locally to alluvial channels downstream and possibly less recharge to ground water in the alluvium. Disturbance would include 87 acres of the Hunter Wash floodplain.

Another significant impact to resources is the disturbance of 11 fossil localities per year totaling 274 for the life of the mine.

Solitude and naturalness in the Bisti WSA would be disrupted by sights and sounds associated with the adjacent surface mining. Scenic badlands adjacent to the WSA would be destroyed by mining.

Eight recorded archaeological sites and 12 predicted sites would be destroyed. Two buildings are located on the tract.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling and reclamation.

One grazing allotment would be impacted by mining operations. Surface disturbance would cause a loss of 319 AUM's of native forage over the life of the mine.

CATALPA CANYON TRACT
MIXED OWNERSHIP - SURFACE MINE

The Catalpa Canyon Tract, approximately 1,040 acres in size, is located 2 to 3 miles southeast of Gallup, New Mexico. The total 1,040 acres of land surface are private. The acreages for the coal reserves are 120 acres unleased Federal and 920 acres for private.

The tract contains mineable reserves of unleased Federal at .4 million tons with the tract total of 8.4 million tons. The recoverable reserves tonnage of unleased Federal is .34 million tons with the tract total of 7.34 million tons. The expected production rate would be 2.5 million tons per year for a projected mine life of 5 years. Total expected revenue from federal coal within the tract is $6.8 million with an expected federal royalty value of $.85 million for the life of the mine. Approximately 40 surface acres would be disturbed annually for unleased Federal coal. Surface disturbance over the life of the mine would total 121 acres.

Approximately 8 employees would be needed to mine the reserves. The mining activities would require approximately 35 acre feet/year of water from deep wells for reclamation and dust control.

Impacts to ground water would result from destruction of the stratified nature of Dilco Coal Member of the Crevasse Canyon formation overburden and the confining layers above Gallup Sandstone. Replacement of these formations with crumbled shale and rubble of a greater porosity would result in downward leakage of water from the overlying Crevasse Canyon formation. This water is of a greater salinity than water at this location in the Gallup Sandstone. There is a possibility of lowering water tables and water quality in wells tapping the same aquifers in the vicinity of the tract. One existing water well within the tract would be destroyed. There would be less runoff locally to alluvial channels downstream and possibly less recharge to ground water in the alluvium.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling and reclamation.

A sensitive state plant specie, Astragalus wingtagus, would be impacted by mining the tract. A more intense survey would be necessary to locate all specific habitat areas within the tract.

Two grazing allotments would be impacted by mining operations. Surface disturbance would cause a loss of 18 AUM's of native forage over the life of the mine.

SUNDANCE TRACT
MIXED OWNERSHIP - SURFACE MINE

The Sundance Tract, approximately 920 acres in size, is located 5 miles southeast of Gallup, New Mexico. The total 920 acres for land surface are private. The acreages for the coal reserves are 720 acres unleased Federal and 200 acres for private.

The tract contains mineable reserves of unleased Federal at 3.7 million tons with the tract total of 5.0 million tons. The recoverable reserves tonnage of unleased Federal is 3.0 million tons with the tract total of 4.0 million tons. The expected production rate would be 200,000 million tons per year for a projected mine life of 22 years. Total expected revenue from federal coal within the tract is $62 million with an expected federal royalty value of $7.75 million for the life of the mine. Approximately 23 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 458 acres.

Approximately 15 employees would be needed to mine the reserves. The mining activities would require approximately 15 acre feet/year of water from deep wells for reclamation and dust control.

Impacts to ground water would result from destruction of the stratified nature of the Dilco Coal Member of the Crevasse Canyon formation overburden and the confining layers above the Gallup Sandstone. Replacement of these formations with crumbled shale and rubble of a greater porosity would

result in downward leakage of water from the overlying Crevasse Canyon formation. This water is of a greater salinity than water at this location in the Gallup Sandstone. There is a possibility of lowering water tables and water quality in wells tapping the same aquifers in the vicinity of the tract. There would be less runoff locally to alluvial channels downstream and possibly less recharge to ground water in the alluvium.

Another significant impact to resources is the destruction of 17 known archaeological sites and approximately 6 predicted sites. Seven occupied dwellings are scattered throughout the tract.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling and reclamation.

One grazing allotment would be impacted by mining operations. Surface disturbance would cause a loss of 56 AUM's of native forage over the life of the mine. Livestock improvements that would be impacted (destroyed) during mining operations include 1 water well and 1.5 miles of fence.

SAMSON LAKE #2 TRACT
MIXED OWNERSHIP - SURFACE MINE

The Samson Lake #2 Tract, approximately 2,440 acres in size, is located 9 miles northwest of Gallup, New Mexico. Of the total 2,440 acres for land surface 320 acres are unleased Federal, and 1,280 acres are private. The acreages for the coal reserves are 2,040 acres unleased Federal and 400 acres for private.

The tract contains mineable reserves of unleased Federal at 11 million tons with the tract total of 25 million tons. The recoverable reserves tonnage of unleased Federal is 9 million tons with the tract total of 21 million tons. The expected production rate would be 1.0 million tons per year for a projected mine life of 20 years. Total expected revenue from federal coal within the tract is $213.4 million with an expected federal royalty value of $26.68 million for the life of the mine. Approximately 7 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 140 acres.

Approximately 40 employees would be needed to mine the reserves. The mining activities would require approximately 10 acre feet/year from deep wells for reclamation and dust control.

If good operational procedures such as reduced vehicle speeds and dust controls are practiced by mine operators, the estimated maximum off-site, total suspended particulates (TSP) would be 20 micro grams per cubic meter (ug/m3). The background air quality in the area is estimated at 30 ug/m3. This would give a total of approximately 50 ug/m3. The air quality could exceed the annual New Mexico standard if good operational procedures are not instituted.

Impacts to ground water would result from destruction of the stratified nature of the Dilco Coal Member of the Crevasse Canyon formation overburden and the confining layers above the Gallup Sandstone. Replacement of these formations with crumbled shale and rubble of a greater porosity would result in downward leakage of water from the overlying Crevasse Canyon formation. This water is of a greater salinity than water at this location in the Gallup Sandstone. There is a possibility of lowering water tables and water quality on wells tapping the same aquifers in the vicinity of the tract. One existing water well within the tract would be destroyed. Runoff locally to alluvial channels downstream would be reduced and there would be less recharge to ground water in the alluvium.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling, and reclamation.

One cultural site and between 16 and 73 predicted sites would be destroyed by surface mining. Fifteen Navajo dwellings are scattered throughout the tract.

Two grazing allotments would be impacted by mining operations. Surface disturbance would cause a loss of 19 AUM's of native forge over the life of the mine.

LA PLATA #3 TRACT
MIXED OWNERSHIP - SURFACE MINE

The La Plata #3 Tract, approximately 240 acres in size, is located 20 miles north of Farmington, New Mexico. Of the total 240 acres for land surface 160 acres are unleased Federal, 40 acres are State and 40 acres are private. The acreages for the coal reserves are 200 acres unleased Federal and 40 acres for State.

The tract contains mineable resources of unleased Federal at 2.0 million tons with the tract total of 5.0 million tons. The recoverable reserves tonnage of unleased Federal is 2.0 million tons with the tract total of 4.0 million tons. The expected production rate would be 0.2 million tons per year for a projected mine life of 24 years. Total expected revenue from federal coal within the tract is $40 million with an expected federal royalty value of $5 million for the life of the mine. Approximately 16 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 160 acres.

Approximately 31 employees would be needed to mine the reserves. The mining activities would require approximately 100 acre feet/year of water from deep wells for reclamation and dust control.

Impacts to ground water would result from destruction of the stratified nature of the Fruitland formation overburden and all confining layers above the Pictured Cliff Sandstone. These would be replaced with crumbled shale and sandstone rubble of a greater porosity. This may result in

upward leakage from the underlying Pictured Cliffs Sandstone which contains water of a much greater salinity. There is also a possibility of a lowering of water levels in wells tapping the same aquifers in the vicinity of the tract. There would be less runoff locally to alluvial channels downstream and possibly less recharge to ground water in the alluvium.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling and reclamation.

Approximately 100 acres of the tract are used by wintering mule deer and elk from December 1 through March 31. Mining would result in forced movements of wintering wildlife due to stress.

Three archaeological sites would be destroyed by mining activities. Other sites could exist since less than 4% of the tract has been inventoried.

One grazing allotment would be impacted by mining operations. Surface disturbance would cause a loss of 21 AUM's/year of native forage over the life of the mine.

LA PLATA #4 TRACT
MIXED OWNERSHIP - UNDERGROUND MINE

The La Plata #4 Tract, approximately 600 acres in size, is located 15 miles north of Farmington, New Mexico. Of the total 600 acres for land surface 240 acres are unleased Federal and 360 acres are private. The acreages for the coal reserves are 600 acres unleased Federal.

The tract contains mineable resources of unleased Federal at 15.5 million tons with the tract total of 15.5 million tons. The recoverable resources tonnage of unleased Federal is 10 million tons with the tract total of 10 million tons. The expected production rate would be .50 million tons per year for a projected mine life of 23 years. Total expected revenue from federal coal within the tract is $252.5 million with an expected federal royalty value of $20.2 million for the life of the mine. A maximum of 80 surface acres would be disturbed over the life of the underground mine for placement of the related surface facilities.

Approximately 125 employees would be needed to mine the reserves. The mining activities would require approximately 40 acre feet/year of water from deep wells for mining operations.

Impacts to ground water would result from subsidence disrupting overlying bedrock aquifers in the Fruitland formation. Fracturing would cause contamination of aquifers in the alluvial and Fruitland formations. Water utilized in the mining operation would cause a lowering of water levels in wells tapping the same aquifers. Water seepage from the Pictured Cliffs Sandstone into the mine could affect yield and water level in a water well located west of the tract.

A Federal Threatened or Endangered Plant species habitat, Castillija chromosa, could be impacted by placement of surface facilities. A more intense survey would be necessary to locate all specific habitat areas within the tract.

Five archaeological sites could be damaged or destroyed by mine subsidence. The largest site (LA 5605) is an Anasazi site with at least six room blocks, approximately 500 feet x 3,500 feet.

Two grazing allotments would be impacted by mining operations. Surface disturbance would cause a loss of 4 AUM's of native forage over the life of the mine. One livestock reservoir could be impacted by placement of surface facilities or subsidence.

STAR LAKE EAST #2 (LC) TRACT
MIXED OWNERSHIP - UNDERGROUND MINE

The Star Lake East #2 (LC) Tract, approximately 1,760 acres in size, is located 85 miles south of Farmington, New Mexico. Of the total 1,760 acres for land surface 1,600 acres are unleased Federal and 160 acres are private. The acreages for the coal reserves are 1,760 acres unleased Federal.

The tract contains mineable resources of unleased Federal at 32.0 million tons with the tract total of 32.0 million tons. The recoverable resources tonnage of unleased Federal is 21 million tons with the tract total of 21 million tons. The expected production rate would be 1.0 million tons per year for a projected mine life of 24 years. Total expected revenue from federal coal within the tract is $517.5 million with an expected federal royalty value of $41.4 million for the life of the mine. A maximum of 80 surface acres would be disturbed over the life of the underground mine for placement of the related surface facilities.

Approximately 250 employees would be needed to mine the resources. The mining activities would require approximately 71 acre feet/year of water from deep wells for mining operations.

Mine subsidence would fracture overlying bedrock aquifers in the Fruitland and Ojo Alamo Sandstone formations. This would reduce well yields, water levels, and possibly water quality of wells located in the vicinity of the tract.

One dwelling is located within the tract. An area considered by Navajo Indians to be sacred is located within the tract, but no definite boundaries have been established. Placement of surface facilities would impact the sacred area.

Between 15 and 31 archaeological sites have been predicted within the tract. These sites could be damaged or destroyed by placement of surface facilities.

Sights and sounds associated with the mining operation could disrupt the aesthetics along the Continental Divide National Scenic Trail.

One grazing allotment would be impacted by mining operations. Surface disturbance would cause a loss of 7 AUM's of native forage over the life of the mine.

CROWNPOINT NORTHEAST TRACT
MIXED OWNERSHIP - SURFACE MINE

The Crownpoint Northeast Tract, approximately 8,800 acres in size, is located 5 miles northeast of Crownpoint, New Mexico. Of the total 8,800 acres for land surface 560 acres are unleased Federal, 520 acres are State, 4,560 acres are private, and 3,160 acres are withdrawn by Public Land Order 2198 for Indian use. The acreages for the coal reserves are 8,280 acres unleased Federal, and 520 acres for State.

The tract contains mineable reserves of unleased Federal at 150.0 million tons with the tract total of 150.0 million tons. The recoverable reserves tonnage of unleased Federal is 94.0 million tons with the tract total of 94.0 million tons. The expected production rate would be 2.4 million tons per year for a projected mine life of 41 years. Total expected revenue from federal coal within the tract is $1.88 billion with an expected federal royalty value of $235 million for the life of the mine. Approximately 206 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 8,238 acres.

Approximately 285 employees would be needed to mine the reserves. The mining activities would require approximately 125 acre feet/year of water from deep wells for reclamation and dust control.

Air quality would be impacted by an increase in total suspended particulates (TSP) of 29 micro grams per cubic meter (ug/m3). Background air quality in the area is estimated at 30 ug/m3. This would result in a total of 59 ug/m3, with the the annual New Mexico standard being 60 ug/3.

Impacts to ground water would result from the destruction of the stratified nature of the Menefee formation and all confining layers above the Point Lookout Sandstone. These would be replaced by crumbled shale and sandstone rubble of a greater porosity. This may result in upward leakage of water from the underlying Point Lookout Sandstone causing a greater salinity in water of the Menefee formation. There is a possibility of a lowering water levels, well yields, and changes in water quality in wells tapping these formations.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling, and reclamation.

Paleontological resources would be impacted by the destruction of three significant fosssil sites.

There are 37 dwellings scattered throughout the tract.

No known sites have been found. However predictions of approximately 110 sites have been projected from inventories conducted adjacent to the tract. These sites would be destroyed by mining.

One grazing allotment would be impacted by mining operations. Surface disturbance would cause a loss of 948 AUM's of native forage over the life of the mine. Livestock improvements to be impacted (destroyed) during mining operations include 3 waterwells, 8.5 miles of water pipelines, and 3 livestock reservoirs.

CROWNPOINT EAST TRACT
MIXED OWNERSHIP - SURFACE MINE

The Crownpoint East Tract, approximately 10,640 acres in size, is located 6 miles east of Crownpoint, New Mexico. Of the total 10,640 acres for land surface 160 acres are unleased Federal and 5,620 acres are private, and 4,560 acres are withdrawn by Public Land Order 2198 for Indian use. The acreages for the coal reserves are 9,880 acres unleased Federal and 760 acres for private.

The tract contains mineable reserves of unleased Federal at 149.0 million tons with the tract total of 278.0 million tons. The recoverable reserves tonnage of unleased Federal is 124.0 million tons with the tract total of 129.0 million tons. The expected production rate would be 6.76 million tons per year for a projected mine life of 21 years. Total expected revenue from federal coal within the tract is $2.47 billion with an expected federal royalty value of $308 million for the life of the mine. Approximately 261 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 10,440 acres.

Approximately 216 employees would be needed to mine the reserves. The mining activities would require approximately 250 acre feet/year of water from deep wells for reclamation and dust control.

Air quality would be impacted by an increase in total suspended particulates (TSP) of 46 micro grams per cubic meter (ug/m3). Background air quality in the area is estimated at 30 ug/m3. This would result in a total 76 ug/m3, exceeding the annual New Mexico standard by 16 ug/m3.

Impacts to ground water would result from the destruction of the stratfied nature of the Menefee formation and all confining layers above the Point Lookout Sandstone. These would be replaced by crumbled shale and sandstone rubble of a greater porosity. This may result in upward leakage of water from the underlying Point Lookout Sandstone causing a greater salinity in water of the Menefee formation. There is a possibility of a lowering water levels, well yields, and changes in water quality in wells tapping these formations.

Surface disturbance on this tract would increase erosion, soil contamination, changing soils characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling, and reclamation.

Paleontological resources would be impacted by the destruction of three recorded fossil sites and any existing potentially important sites.

Sights and sounds associated with the mining operations could disrupt the aesthetics along the Continental Divide National Scenic Trail.

There are 25 dwellings scattered throughout the tract. These dwellings would be destroyed by mining.

One grazing allotment would be impacted by mining operations. Surface disturbance would cause a loss of 1,196 AUM's of native forge over the life of the mine. Livestock improvements to be impacted (destroyed) during mining operations include 1 waterwell, 19.5 miles of fence, and 2 livestock reservoirs.

CHICO WASH SOUTH TRACT
MIXED OWNERSHIP - SURFACE MINE

The Chico Wash South Tract, approximately 12,190 acres in size, is located 30 miles Northeast of Grants, New Mexico. Of the total 12,190 acres for land surface 10,070 acres are unleased Federal, 40 acres are State and 2,080 acres are private. The acreages for the coal reserves are 11,670 acres unleased Federal, 40 acres for State and 480 acres for private.

The tract contains mineable reserves of unleased Federal at 74.0 million tons with the tract total of 80 million tons. The recoverable reserves tonnage of unleased Federal is 63.0 million tons with the tract total of 71.0 million tons. The expected production rate would be 1.8 million tons per year for a projected mine life of 42 years. Total expected revenue from federal coal within the tract is $1.31 billion with an expected federal royalty value of $164 million for the life of the mine. Approximately 148 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 5,907 acres.

Approximately 120 employees would be needed to mine the reserves. The mining activities would require approximately 400 acre feet/year of water from deep wells for reclamation and dust control.

Air quality would be impacted by an increase in total suspended particles (TSP) of 23 micro grams per cubic meter (ug/m3). Background air quality in the area is estimated at 30 ug/m3. This would result in a total of 53 ug/m3, with the annual New Mexico standard being 60 ug/m3.

Impacts to ground water would result from destruction of the Menefee formation (Cleary Coal Member) overburden and confining layers above the Point Lookout Sandstone. Leakage of poorer quality water from the overlying Menefee

into the Point Lookout Sandstone would occur. The Point Lookout aquifer is of particular significance because of the high chemical quality of water and importance as a major aquifer for the San Juan Basin. One BLM water well and one private well located within the tract would be destroyed. Two BLM wells tapping the Point Lookout Sandstone and one BLM well tapping the Gallup Sandstone aquifer would be impacted by reduction of well yields, lowering of water levels, and possible changes in water quality. Eight springs within the tract would be destroyed by mining since water originates in the Cleary Coal Member of the Menefee formation. Two of these springs, Ojo Azabache and Coal Spring have been declared as Public Water Reserves. Arroyo Chico is a perennial stream due to discharge of uranium mine water from the San Mateo area. The stream flow of 3 to 4 cubic feet per second would be difficult to impound or divert and erosion would increase after reclamation.

An interesting historical site, Azabache Station, that provides historical sightseeing opportunities would be destroyed by mining operations. Four archaeological sites that have been recorded within the tract would be destroyed.

Surface disturbance on this tract would increase erosion, soil contaimination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling, and reclamation.

One grazing allotment would be impacted by mining operation. Surface disturbance would cause a loss of 925 AUM's of native forage over the life of the mine. Livestock improvements to be impacted (destroyed) during mining operations include three waterwells, 10.5 miles of fence, and five livestock reservoirs.

TA-HA-BAH WELL TRACT
MIXED OWNERSHIP - UNDERGROUND MINE

The Ta-Ha-Bah Well Tract, approximately 3,080 acres in size, is located 6 miles south of Gallup, New Mexico. The total 3,080 acres for land surface are private. The acreages for the coal reserves are 3,080 acres unleased Federal.

The tract contains mineable reserves of unleased Federal at 23 million tons with the tract total of 23 million tons. The recoverable reserves tonnage of unleased Federal is 12 million tons with the tract total of 12 million tons. The expected production rate would be .7 million tons per year for a projected mine life of 13 years. Total expected revenue from federal coal within the tract is $352.5 million with an expected federal royalty value of $28.2 million for the life of the mine. A maximum of 80 surface acres would be disturbed over the life of the underground mine for placement of the related surface facilities.

Approximately 175 employees would be needed to mine the reserves. The mining activities would require approximately 40 acre feet per year of water from deep wells for mining operations.

Mine subsidence would fracture ovelying bedrock aquifers in the Crevasse Canyon formation. This would reduce well yields, water levels, and possibly water quality of wells located in the vicinity of the tract. Two known wells exist within the tract. Mine subsidence and/or dewatering would affect the quantity and quality of water available to these and other wells in the vicinity.

No known archaeological sites have been recorded within the tract, however, projections of inventories conducted near the tract indicate approximately 67 predicted sites could exist. The sites could be destroyed by placement of surface facilities or fractured by mine subsidence.

There are 21 dwellings scattered throughout the tract. Mine subsidence could create safety hazards and damage to dwellings.

Two grazing allotments would be impacted by mining operations. Surface disturbance would cause a loss of 9 AUM's of native forage over the life of the mine.

HOGBACK TRACT
MIXED OWNERSHIP - SURFACE MINE

The Hogback Tract, approximately 1,760 acres in size, is located 4 miles southeast of Gallup, New Mexico. Of the total 1,760 acres for land surface 360 acres are unleased Federal and 1,400 acres are private. The acreages for the coal reserves are 1,760 acres unleased Federal.

The tract contains mineable reserves of unleased Federal at 5.0 million tons with the tract total of 5.0 million tons. The recoverable reserves tonnage of unleased Federal is 4.0 million tons with the tract total of 4.0 million tons. The expected production rate would be 200,000 million tons per year for a projected mine life of 23 years. Total expected revenue from federal coal within the tract is $86 million with an expected federal royalty value of $10.8 million for the life of the mine. Approximately 43 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 898 acres.

Approximately 15 employees would be needed to mine the reserves. The mining activities would require approximately 30 acre feet/year of water from deep wells for reclamation and dust control.

Impacts to ground water would result from destruction of the stratified nature of the Dilco Coal Member of the Crevasse Canyon formation overburden and the confining layers above the Gallup Sandstone. Replacement of these formations with crumbled shale and rubble of a greater porosity would result in downward leakage of water from the overlying Crevasse Canyon formation. This water is of a greater salinity than water at this location in the Gallup Sandstone. There is a possibility of lowering water tables and water quality in wells tapping the same aquifers in the vicinity of the tract. One existing water well within the tract would be destroyed. There would be less runoff locally to alluvial channels downstream and possibly less recharge to ground water in the alluvium.

Surface disturbance on this tract would increase erosion. Soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling and reclamation.

No archeological sites are known to have been recorded in the tract; however, approximately 39 sites have been predicted from inventoried conducted near the tract. These sites would be destroyed by mining.

A federal listed Threatened and Endangered plant species, Astragalas wingatus, may ocurr within the tract according to a township survey of possible occurrence. If present his specie would be destroyed.

Seventeen dwellings and one developed trailer park are located within the tract. The trailer park is located in the extreme northwestern portion of the tract and could be dropped from lease consideration without affecting access to the trailer park. Fourteen of the 17 homes are concentrated in SW1/4 of Section 19, T. 15 N., R. 18 W., NMPM. The SW1/4 of Section 19 is the only portion of Section 19 that was delineated as the tract and could possibly be dropped from lease consideration.

Two grazing allotments would be impacted by mining operations. Surface disturbance would cause a loss of 107 AUM's of native forage over the life of the mine.

TWIN BUTTES TRACT
MIXED OWNERSHIP - SURFACE MINE

The Twin Buttes Tract, approximately 8,800 acres in size, is located 6 miles southwest of Gallup, New Mexico. Of the total 8,800 acres for land surface 320 acres are unleased Federal and 4,790 acres are private, and 3,690 acres are withdrawn by Public Land Order 2198 for Indian Use. The acreages for the coal reserves are 8,640 acres unleased Federal and 160 acres for private.

The tract contains mineable reserves of unleased Federal at 35.0 million tons with the tract total of 68.0 million tons. The recoverable reserves tonnage of unleased Federal is 29.7 million tons with the tract total of 30.0 million tons. The expected production rate would be 1.0 million tons per year for a projected mine life of 22 years. Total expected revenue from federal coal within the tract is $574 million with an expected federal royalty value of $71.8 million for the life of the mine. Approximately 250 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 5,000 acres.

Approximately 75 employees would be needed to mine the reserves. The mining activities would require approximately 150 acre feet/year of water from deep wells for reclamation and dust control.

Air quality would be impacted by an increase in total suspended particulates (TSP) of 30 micro grams per cubic meter (ug/m3). Background

air quality in the area is estimated at 30 ug/m3. This would result in a total of 60 ug/m3 reaching the annual New Mexico standard of 60 ug/m3.

Impacts to ground water would result from destruction of the stratified nature of the Dilco Coal Member of the Crevasse Canyon formation overburden and the confining layers above the Gallup Sandstone. Replacement of these formations with crumbled shale and rubble of a greater porosity would result in downward leakage of water from the overlying Crevasse Canyon formation. This water is of a greater salinity than water at this location in the Gallup Sandstone. There is a possibility of lowering water tables and water quality in wells tapping the same aquifers in the vicinity of the tract. Four existing water wells within the tract would be destroyed. There would be less runoff locally to alluvial channels downstream and possibly less recharge to ground water in the alluvium.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling and reclamation.

There are 19 recorded fossil localities within the tract with a potential for discovery of important material discoveries in these exposures.

No known archaeological sites have been recorded; however, one petroglyph site exists and 234 archaeological sites have been predicted within the tract. These sites would be destroyed by mining.

There are 93 dwellings scattered through out this tract. These dwellings would be destroyed by mining and relocation would be necessary.

Two grazing allotments would be impacted by mining operations. Surface disturbance would cause a loss of 584 AUM's of native forage over the life of the mine. Livestock improvements that would be impacted (destroyed) during mining operations include 1 water well and 2.5 miles of water pipeline.

PINEHAVEN TRACT
MIXED OWNERSHIP - SURFACE MINE

The Pinehaven Tract, approximately 20,400 acres in size, is located 18 miles south of Gallup, New Mexico. Of the total 20,400 acres for land surface 1,120 acres are State and 19,280 acres are private. The acreages for the coal reserves are 9,680 acres unleased Federal, 1,120 acres for State and 9,600 acres for private.

The tract contains mineable reserves of unleased Federal at 7 million tons with the tract total of 7 million tons. The recoverable reserves tonnage of unleased Federal is 6 million tons with the tract total of 6 million tons. The expected production rate would be .315 million tons per year for a projected mine life of 23 years. Total expected revenue from federal coal within the tract is $126 million with an expected federal royalty value of

$15.75 million for the life of the mine. Approximately 29 surface acres would be disturbed annually for unleased Federal coal. Surface disturbance over the life of the mine would total 588 acres for unleased Federal Coal.

Approximately 24 employees would be needed to mine the reserves. The mining activities would require approximately 20 acre feet/year of water from deep wells for reclamation and dust control.

Impacts to ground water would result from destruction of the stratified nature of the Dilco Coal Member of the Crevasse Canyon formation overburden and the confining layers above the Gallup Sandstone. Replacement of these formations with crumbled shale and rubble of a greater porosity would result in downward leakage of water from the overlying Crevasse Canyon formation. This water is of a greater salinity than water at this location in the Gallup Sandstone. There is a possibility of lowering water tables and water quality in wells tapping the same aquifers in the vicinity of the tract. Seven existing water wells within the tract would be destroyed. There would be less runoff locally to alluvial channels downstream and possibly less recharge to groundwater in the alluvium.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling and reclamation.

Nineteen recorded archaeological sites and 191 predicted sites would be destroyed by mining.

There are 107 dwellings located within the tract. Fifty dwellings are located on Navajo Tribal land of Section 16, T. 13 N., R. 17 W., NMPM. Section 16 is located in the extreme northeastern edge of the tract, with only the south boundary adjacent to the remainder of the tract. If this section is dropped from lease consideration, nearly 50% of the homes within this tract would not be relocated. The remaining 57 dwellings are scattered throughout the tract.

One grazing allotment would be impacted by mining operations. Surface disturbance would cause a loss of 72 AUM's of native forge over the life of the mine.

BREAD SPRINGS #1 TRACT
MIXED OWNERSHIP - SURFACE MINE

The Bread Springs #1 Tract, approximately 1,116 acres in size, is located 7 miles southeast of Gallup, New Mexico. Of the total 1,116 acres for land surface 160 acres are State and 956 acres are private. The acreages for the coal reserves are 636 acres unleased Federal, 160 acres for State and 320 acres for private.

The tract contains mineable reserves of unleased Federal at .85 million tons with the tract total of 1.61 million tons. The recoverable

reserves tonnage of unleased Federal is .7 million tons with the tract total of 1.37 million tons. The expected production rate would be .034 million tons per year for a projected mine life of 21 years. Total expected revenue from federal coal within the tract is $14 million with an expected federal royalty value of $1.8 million for the life of the mine. Approximately 5.9 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 118 acres.

Approximately 3 employees would be needed to mine the reserves. The mining activities would require approximately 20 acre feet/year of water from deep wells for reclamation and dust control.

Impacts to ground water would result from destruction of the stratified nature of the Dilco Coal Member of the Crevasse Canyon formation overburden and the confining layers above the Gallup Sandstone. Replacement of these formations with crumbled shale and rubble of a greater porosity would result in downward leakage of water from the overlying Crevasse Canyon formation. This water is of a greater salinity than water at this location in the Gallup Sandstone. There is a possibility of lowering water tables and water quality in wells tapping the same aquifers in the vicinity of the tract.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling and reclamation.

No paleontological data is available on the tract, however, surveys on adjacent lands produced over 30 fossil sites. Several of these sites are highly significant since the Crevasse Canyon fossils are rare and unstudied. Potentially significant fossils would be destroyed by mining this tract.

No known archaeological sites exist within the tract, however, approximately 16 predicted sites would be destroyed by mining.

There are 17 dwellings scattered throughout the tract that would have to be relocated.

One grazing allotment would be impacted by mining operations. Surface disturbance would cause a loss of 19 AUM's of native forage over the life of the mine.

BREADSPRINGS #2 TRACT
MIXED OWNERSHIP - UNDERGROUND MINE

The Bread Springs #2 Tract, approximately 1,040 acres in size, is located 7 miles southeast of Gallup, New Mexico. The total 1,040 acres of land surface are private. The acreages for the coal reserves are 1,040 acres unleased Federal.

The tract contains mineable reserves of unleased Federal at 10 million tons with the tract total of 12 million tons. The recoverable reserves

tonnage of unleased Federal is 5 million tons with the tract total of 7 million tons. The expected production rate would be .14 million tons per year for a projected mine life of 50 years. Total expected revenue from federal coal within the tract is $135 million with an expected federal royalty value of $1.08 million for the life of the mine. A maximum of 80 surface acres would be disturbed over the life of the underground mine for placement of the related surface facilities.

Approximately 27 mining employees would be needed to mine the reserves. The mining activities would require approximately 30 acre feet/year of water from deep wells for mining operations.

Impacts to ground water would result from subsidence fracturing overlying bedrock aquifers in the Crevasse Canyon formation. Utilization of water for mine operations and formation fracturing could reduce water yields, levels, and water quality in wells tapping the Crevasse Canyon aquifer.

No paleontological data is available on the tract, however, surveys on adjacent lands produced over 30 fossil sites. Several of these sites are highly significant since the Crevasse Canyon fossils are rare and unstudied. Potentially significant fossils would be destroyed by mining this tract.

No known archaeological sites exist within the tract, however, approximately 27 predicted sites would be destroyed by mining.

One grazing allotment would be impacted by mining operations. Surface disturbance would cause a loss of 9 AUM's of native forage over the life of the mine.

GAMERCO #1 (LC) TRACT
MIXED OWNERSHIP - SURFACE MINE

The Gamerco #1 (LC) Tract, approximately 320 acres in size, is located 9 miles northwest of Gallup, New Mexico. Of the total 2,440 acres for land surface 320 acres are unleased Federal and 320 acres are private. The acreages for the coal reserves are 160 acres unleased Federal and 160 acres for private.

The tract contains mineable reserves of unleased Federal at 2.3 million tons with the tract total of 3.6 million tons. The recoverable reserves tonnage of unleased Federal is 1.9 million tons with the tract total of 3.1 million tons. The expected production rate would be 95,000 tons per year for a projected mine life of 22 years. Total expected revenue from federal coal within the tract is $38 million with an expected federal royalty value of $4.75 million for the life of the mine. Approximately 4 surface acres would be disturbed annually. Surface disturbance over the life of the mine would total 75 acres.

Approximately 10 employees would be needed to mine the reserves. The mining activities would require approximately 15 acre feet/year of water from deep wells for reclamation and dust control.

Impacts to ground water would result from destruction of the stratified nature of the Dilco Coal Member of the Crevasse Canyon formation overburden and the confining layers above the Gallup Sandstone. Replacement of these formations with crumbled shale and rubble of a greater porosity would result in downward leakage of water from the overlying Crevasse Canyon formation. This water is of a greater salinity than water at this location in the Gallup Sandstone. There is a possibility of lowering water tables and water quality in wells tapping the same aquifers in the vicinity of the tract. There would be less runoff locally to alluvial channels downstream and possibly less recharge to ground water in the alluvium.

Surface disturbance on this tract would increase erosion, soil contamination, changing soil characteristics and possible loss or destruction of suitable soils which may occur during overburden removal, stockpiling and reclamation.

No known archaeological sites have been recorded, but 13 predicted sites would be destroyed by mining.

Two dwellings are located within the tract and would have to be relocated.

Two grazing allotments would be impacted by mining operations. Surface disturbance would cause a loss of 13 AUM's of native forage over the life of the mine.

GAMERCO #2 (LC) TRACT
MIXED OWNERSHIP - UNDERGROUND MINE

The Gamerco #2 (LC) Tract, approximately 4,480 acres in size, is located 9 miles northwest of Gallup, New Mexico. Of the total 4,480 acres for land surface 40 acres are unleased Federal, 160 acres are State and 4,280 acres are private. The acreages for the coal reserves are 2,120 acres unleased Federal, 160 acres for State and 2,200 acres for private.

The tract contains mineable reserves of unleased Federal at 16.6 million tons with the tract total of 35.4 million tons. The recoverable reserves tonnage of unleased Federal is 8.3 million tons with the tract total of 17.7 million tons. The expected production rate would be .83 million tons per year for a projected mine life of 13 years. Total expected revenue from federal coal within the tract is $415 million with an expected federal royalty value of $33.2 million for the life of the mine. A maximum of 80 surface acres would be disturbed over the life of the underground mine for placement of the related surface facilities.

Approximately 208 mining employees would be needed to mine the reserves. The mining activities would require approximately 145 acre feet/year of water from deep wells for mining operations.

Impacts to ground water would result from subsidence fracturing the Crevasse Canyon and Menefee formations. Water utilized in the mining

operation and subsidence would cause reduced well yields, water levels, and water quality in wells tapping the Crevasse Canyon and Menefee formations.

No archaeological sites are known to have been recorded in the tract, however, between 17 and 76 sites have been predicted from inventories conducted near the tract. These sites would be destroyed by mining.

Thirty five dwellings are located within the tract and would have to be relocated to avoid the possibility of subsidence damage.

Two grazing allotments would be impacted by mining operations. Surface disturbance would cause a loss of 9 AUM's of native forage over the life of the mine.

SAMSON LAKE #1 (LC) TRACT
MIXED OWNERSHIP - UNDERGROUND MINE

The Samson Lake #1 (LC) Tract, approximately 5,600 acres in size, is located 9 miles east-northeast of Gallup, New Mexico. Of the total 5,600 acres for land surface 680 acres are unleased Federal, 80 acres are State and 4,840 acres are private. The acreages for the coal reserves are 4,080 acres unleased Federal, 80 acres for State and 1,440 acres for private.

The tract contains mineable reserves of unleased Federal at 26 million tons with the tract total of 26 million tons. The recoverable reserves tonnage of unleased Federal is 8 million tons with the tract total of 17 million tons. The expected production rate would be 700,000 tons per year for a projected mine life of 23 years. Total expected revenue from federal coal within the tract is $350 million with an expected federal royalty value of $28 million for the life of the mine. A maximum of 80 surface acres would be disturbed over the life of the underground mine for placement of the related surface facilities.

Approximately 175 employees would be needed to mine the reserves. The mining activities would require approximately 45 acre feet/year of water from deep wells for mining operations.

Impacts to ground water would result from subsidence fracturing the Crevasse Canyon and Menefee formations. Water utilized in the mining operation and subsidence would cause reduced well yields, water levels, and water quality in wells tapping the Crevasse Canyon and Menefee formations. Three known wells located within the tract are completed to the Gallup Sandstone formation. If dewatering of the mine is necessary, the yields and water levels of these wells and water wells outside the tract would be reduced.

One recorded archaeological site and up to 147 predicted sites would be destroyed or damaged by surface facilities or subsidence.

There are 33 dwellings that would have to be relocated to avoid safety hazards or damage to homes due to subsidence,

One grazing allotment would be impacted by mining operations. Surface disturance would cause a loss of 9 AUM's of native forage over the life of the mine.

APPENDIX A-2

COAL PROGRAM IMPLEMENTATION TO DATE

The following narrative summarizes the implementation of the federal coal program in the San Juan River Coal Region and presents the history and background leading to the publication of this EIS.

The BLM in New Mexico has developed a land use plan that identifies lands acceptable for competitive coal leasing. Coal-bearing lands of high, moderate, and low development potential were examined to determine their acceptability. Trade-offs with other possible uses were analyzed. The tracts analyzed in this EIS were found suitable for mining. (Documentation of this land use planning process is on file at the BLM's Resource Area Office in Farmington, New Mexico).

The surface owner consultation process was initiated during the BLM's land use planning. Surface owners in the San Juan River Region were consulted about their preference for coal mining on or adjacent to their lands. The response of the surface owners was not considered binding or contractual. Prior to lease sale, industry will be responsible for acquiring formal surface owner consent to mine tracts with private surface overlying federal coal.

On January 26, 1981, the Department of Energy (DOE) established its final goals for national and regional coal production, which included projected goals for the San Juan River Regional Coal Production. Two public hearings were held on the goals projected for the San Juan River Region in July 1981 during an 81-day public comment period. These goals were adopted by the Department of Interior (DOI) in November 1981.

A call for expression of leasing interest was issued by the BLM in September, 1981. Ten companies filed expressions of interest on approximately 2.3 billion tons. One company withdrew its expression of interest (900 million tons), reducing the total expression of interest to 1.14 billion tons. (Information provided by industry is on file with the BLM Albuquerque District Office.)

At an April 1982 meeting the team considered the tract profiles along with the criteria developed at the March meeting and independently prepared federal and state tract ranking reports. The RCT ranked the tracts and selected the alternatives by tract to be considered in the EIS.

APPENDIX A-3

TRACT DELINEATION, SELECTION, AND RANKING

The expressions of industry interest (refer to Appendix A-2) and other geologic and mining information were used by the Minerals Management Service (MMS) to delineate 50 tracts for potential leasing. The tract delineation reports include identification of the coal resources, the annual production potential of each tract, the degree of certainty of the coal data, the expected type of mining, employment required to develop and operate the tract, acreage disturbed, and other information. This information was used to develop a site-specific analysis by the BLM to assess the environmental, social, and economic factors pertinent to or affected by development of each tract. (These analyses are available for review at the Farmington Resource Area Office of the BLM.)

Table A-3-1 presents the factors developed by the RCT for track ranking. Using these factors, each of the 50 tracts were first evaluated by a six-member team of BLM employees from the New Mexico State Office, the Albuquerque District Office, and the Farmington Resource Area Office. These tracts were also evaluated by an independent 14-member team of state employees. Both evaluations were based on geologic, mineral, and engineering information from the tract delineation reports and major impacts from the site-specific analyses for each tract. This information was provided to each member of the RCT, along with maps and other data for use in the tract ranking.

On April 20 and 21, 1982, the RCT met to review the state and federal staff ranking recommendations. Based on the factors listed in Table A-3-1, the RCT ranked the tracts and made a determination of which tracts should be grouped together, arriving at four different leasing levels. These leasing levels have been incorporated into this EIS as four alternatives.

The relative rank of the tracts is portrayed in the range of alternatives. The lower production alternatives contain the most desirable tracts, and the successively higher production alternatives add the less desirable tracts.

Of the original 50 tracts delineated, 39 were carried forward for further leasing and ranking. The summary ranking for each tract is shown in Table A-3-2. Six of the 50 tracts were combined to make three: Bisti #6 and #8 became Bisti #6, Crownpoint East (LC) and Crownpoint East (HC) became Crownpoint East, and Samson Lake #2 (LC) and Samson Lake #2 became Samson Lake #2. Two tracts were recommended as public body tracts (Nageezi and Twin Buttes), and seven tracts were delineated by MMS as small business tracts (Johnson Trading Post, Sundance, Tah-na-bah Well, Hogback, Pinehaven, Bread Springs #1 and Bread Springs #2).

A more detailed discussion of the ranking and selection processes is contained in the minutes of the RCT meetings held on April 20-21, which are available at the BLM New Mexico State Office in Santa Fe.

TABLE A-3-1

TRACT RANKING FACTORS

Coal Economics	Natural Environment	Socioeconomics
Coal Quantity	Air Quality	Public Attitudes
Coal Quality	Water Quality	Revenue Generation
Energy Production Potential	Wildlife	Lifestyle and Social Structure
Transporation	Reclamation Potential	Community and Social Structure
Surface Ownership	Archaeology	Unsuitability Criteria
	Paleontology	Consistency with Other Plans & Policies
	Historic Properties	Agricultural Operations
	Other Unique Resources	Relocation of Occupants
	Transportation	
	Unsuitability Criteria	

TABLE A-3-2

RANKING OF COAL TRACTS IN THE SAN JUAN RIVER REGION
NEW MEXICO

Tract	Summary Ranking	Rationale
La Plata #1	Medium	High quantity and quality of surface mineable coal, production potential moderate, federal surface, transportation would probably be by truck, some impacts to air quality, wildlife (deer winter range) and archaeology, minimal impact to water resources, no surface occupants, general public attitude is good, and socioeconomic impacts are expected to be minimal.
La Plata #2	Medium	High quantity and quality of underground mineable coal, production potential moderate, federal surface, transportation would probably be by truck, some impacts to archaeology, no surface occupants, general public attitude is good, and socioeconomic impacts are expected to be minimal.
La Plata #3	Medium	Low confidence in the quantity and quality of the coal resource for surface mineable coal, poduction potential is low, transportation would probably be by truck, the surface is primarily federal, some impacts to archaeology, air quality, wildlife (deer winter range), minimal impact to water resources, no surface occupants, general public attitude is good, and socioeconomic impacts are expected to be minimal.
La Plata #4	Medium	Low confidence in the quantity and quality of the coal resource for underground mineable coal, production potential is low, tranportation would probably be by truck, surface is primarily private, some impacts to archaeology and a plant of high state interest, general public attitude is good, and socioeconomic impacts are expected to be minimal.
Johnson Trading Post	Medium	Moderate quantity and quality of surface mineable coal, production potential moderate, transportation to the proposed Star Lake railroad would be greater than five miles, surface ownership is primarily federal with some private ownership, major impacts to air quality and paleontology, some impacts to wildlife, archaeology, and historic resources, minimal impacts would occur to water, general public attitudes are favorable, a major impact on socioeconomics would likely occur, and families do occupy an area of this tract. Portions of this tract may need to be dropped in the areas of wildlife and occupant conflicts.

TABLE A-3-2 (cont'd)

Tract	Summary Ranking	Rationale
Star Lake East #1	Medium	High quantity and quality of surface mineable coal, production potential is moderate, transportation to the Proposed Star Lake railroad is greater than five miles, surface ownership is mixed but is primarily federal, major impacts to air quality and paleontology, some impacts to water resources, archaeology and historic resources, general public attitude is favorable, a major impact on socioeconomics is expected to occur, families do occupy this tract.
Star Lake East (LC)	Medium	Low confidence in the quantity and quality of the coal resource for underground mineable coal, production potential is moderate, transporation to the proposed Star Lake railroad is greater than five miles, surface ownership is primarily federal, some impacts are expected to occur to air quality, water resources and archaeology, general public attitude is favorable, impacts to socioeconomic resources are expected to occur, relocation of occupants will be minimal.
Star Lake West #2	Medium	High quantity and quality of surface mineable coal, production potential is moderate, transportation to the proposed Star Lake railroad is less than five miles, surface ownership is mixed federal and state, major impacts are expected to occur to air quality and paleontology, some impact to water resources, archaeology, historic and the Continental Divide Trail, general public attitude is favorable, and impacts to socioeconomics expected to be moderate.
Kimbeto #1	Medium	High quantity and quality of underground mineable coal, production potential moderate, transportation to the proposed Star Lake railroad is less than five miles, surface ownership is mixed federal and private with surface ownership primarily federal, some impacts would occur to archaeology and water quality, general public attitude is favorable, impacts to socioeconomics are expected, and families do occupy portions of this tract.

TABLE A-3-2 (cont'd)

Tract	Summary Ranking	Rationale
Kimbeto #2	Medium	High quantity and quality of surface mineable coal, production potential is moderate, transportation to the proposed Star Lake railroad is less than five miles, surface ownership is federal, major impacts are expected to occur to air quality and paleontology, some impacts would occur to water resources, and archaeology, general public attitude is favorable, social economic impacts are expected to be minimal.
Nageezi	Medium	High quantity and quality of underground mineable coal, production potential is moderate, transportation to the proposed Star Lake railroad is greater than five miles, surface ownership is mixed but primarily federal, some impacts would occur to water resources and archaeology, general public attitude is favorable, some impacts to socioeconomics are expected, families do occupy areas of this tract.
Gallo Wash #1	Medium	High quantity and quality of surface mineable coal, production potential is favorable, transportation to the proposed Star Lake railroad is less than five miles, surface is primarily private with some federal ownership, major impacts are expected to occur to air quality and paleontology, some impacts would occur to water resources and archaeology, general public attitude is moderate, and socioeconomic impacts are expected to be moderate.
Gallo Wash #2	Medium	Moderate quantity and quality of underground mineable coal, production potential is moderate, transportation to the proposed Star Lake railroad is greater than five miles, surface ownership is mixed with primary ownership being state, some impacts would occur to water resources and archaeology, general public attitude is favorable, socioeconomic impacts are expected to be minimal, occupants do occur on areas of this tract.

TABLE A-3-2 (cont'd)

Tract	Summary Ranking	Rationale
Bisti #1	Medium	High quantity and quality of surface mineable coal, production potential is moderate, transportation to the proposed Star Lake railroad is less than five miles, surface ownership is mixed, but is primarily federal, major impacts to air quality and paleontology would occur, some impacts to water resources, archaeology and recreation resources in the Bisti Badlands, general public attitude and economics are favorable, known Navajo sacred and historic areas, no occupants.
Bisti #2	Medium	High quantity and quality of surface mineable coal, production potential is moderate, transportation to the potential Star Lake railroad is less than five miles, surface ownership is mixed and is primarily private, major impacts to paleontology, some impacts to air quality, water resources, archaeology, and recreation are expected to occur, general public attitude and economics are favorable, social impacts are moderate. Occupants do occur on areas of this tract.
Bisti #4	Medium	High quantity and quality of surface mineable coal, production potential moderate, transportation to the proposed Star Lake railroad is less than five miles, surface ownership is mixed with private land and federal land being nearly equal, major impacts to paleontology and wildlife area for the ferruginous hawk (acreage for these high federal interest species would need to be dropped out), impacts would occur to air quality, water resources and archaeology, general public attitude is favorable, socioeconomic impacts are expected to be minimal, known Navajo gathering areas occur on the tracts, no occupants.

TABLE A-3-2 (cont'd)

Tract	Summary Ranking	Rationale
Bisti #6	Medium	High quantity and quality of surface mineable coal, production potential moderate, transportation to the proposed Star Lake railroad is less than five miles, surface ownership mixed with primairly private lands under Navajo ownership, major impacts to paleontology and unique scenic resources of the Bisti Badlands, some impacts to air quality and archaeology, general public attitude is unfavorable, social impacts to the Navajo is considerable, known burial sites occur on tract, economic impacts are minimal, occupants do occur on areas of this tract.
Lee Ranch East	High	High quantity and quality of surface mineable coal, production potential high, transportation to the proposed Star Lake railroad is greater than fifteen miles, private surface, some impacts to air quality, water resources and archaeology, general public attitude is good, socioeconomic impacts are expected to be minimal, no occupants.
Lee Ranch Middle	Medium	High quantity and quality of surface mineable coal, production potential moderate, transportation to the proposed Star Lake railroad is less than fifteen miles, private surface, major impacts to air quality and water resources, some impacts to wildlife and archaeology are expected, general public attitude is good, some impacts on socioeconomics are expected, no occupants.
Lee Ranch West	High	High quantity and quality of surface mineable coal, production potential high, transporation to the proposed Star Lake railroad is less than fifteen miles, private ownership, major impacts to air quality, some impacts to water resources and archaeology, general public attitude is good, some impacts on socioeconomics are expected, no occupants.

TABLE A-3-2 (cont'd)

Tract	Summary Ranking	Rationale
Divide	High	High quantity and quality of surface mineable coal, production potential high, proposed Star Lake railroad traverses the tract, surface ownership is primarily private, consent has been given, some impacts to air and water resources, general public attitude is good, some impacts for socioeconomics are expected, occupants occur in the southwest portion of the tract.
Crownpoint Northeast	Medium	Moderate confidence in the quantity and quality of surface mineable coal, production potential is low, transportation to the proposed Star Lake railroad is greater than fifteen miles, primarily Navajo owned surface, major impacts to air quality, some impacts to archaeology and State listed high interest plant species, general public attitude is unfavorable, major impacts on socioeconomics, and thirty seven (37) occupied homes occur on the tract.
Crownpoint East	Medium	Moderate confidence in the quantity and quality of surface mineable coal, production potential is moderate, transportation to the proposed Star Lake railroad is less than fifteen miles, primarily Navajo surface, some impacts to air, water, and archaeology resources, general public attitude is favorable, major impacts on socioeconomics and twenty five (25) occupied homes occur on the tract.
Hospah #1	High	High quantity and quality of surface mineable coal, production potential is high, proposed Star Lake railroad passes through tract, no federal surface, major impacts to air quality, some impacts to water resources, wildlife, archaeology, and the CDNST, general public attitude is good, little impact to socioeconomics is expected, no occupants.
Hospah #2	High	High quantity and quality of underground mineable coal production potential is high, proposed Star Lake railroad passes within one mile of tract, no federal surface, some impacts to CDNST, general public attitude is good, socioeconomic impacts are expected to be minimal, no occupants.

TABLE A-3-2 (cont'd)

Tract	Summary Ranking	Rationale
Chico Wash South	Medium	Moderate confidence in the quantity and quality of surface mineable coal, production potential is low, transportation to the proposed Star Lake railroad is greater than fifteen miles, primarily federal surface, major impacts to air quality, water resources, and wilderness, some impacts to archaeology and historic resources (Azabache Stage Station located in tract boundaries), public has expressed concern due to close proximity to WSA, socioeconomic impacts are expected to be significant, no occupants.
Catalpa Canyon	Medium	High quantity and quality of surface mineable coal, production potential is moderate, transportation to the AT and SF railroad is less than five miles, all private surface, some impacts to air quality, and state high interest plant species, general public attitude is favorable, socioeconomic impacts are expected to be minimal, no occupants.
Sundance	Medium	High quantity and quality of surface mineable coal production potential is moderate, transportation is less than five miles to AT and SF railroad, Navajo surface, major impacts to archaeology, some impacts to air quality, general public attitude is favorable, major impacts to social well being and minimal impact to economics, seven (7)occupied homes on the tract.
Tah-ha-bah Well	Low	Low confidence in the coal, natural environment and socioeconomic data available for this tract, however, small business has expressed interest in this tract, twenty one (21) occupied homes.
Hogback	Low	Low confidence in the coal, natural environment and socioeconomic data thats available for this tract, however small business has expressed interest in this tract, state listed high interest species, adjacent to high school, seventeen (17) occupied homes and a fully occupied trailer court occurs on this tract.

TABLE A-3-2 (cont'd)

Tract	Summary Ranking	Rationale
Twin Buttes	Low	Low confidence in the coal, natural environment, and socioeconomic data available for this tract, however small business has expressed interest in this tract, ninty three (93) occupied homes occur on this tract.
Pinehaven	Medium	Low confidence in the coal, natural environment and socioeconomic data available for this tract, small business has expressed interest and would acquire more coal data and work with surface ownership to acquire consent, no federal ownership, transportation to the AT and SF railroad is less than fifteen miles, some impacts to archaeology, water and air quality, one hundred and seven (107) occupied homes occur on the tract, general public attitude is unfavorable.
Bread Springs #1	Medium	Low confidence in the coal, natural environment, and socioeconomic data that's available for this tract, small business has expressed interest in obtaining additional coal data and will try to get surface owner consent, no federal surface, some impacts to air quality, general public attitude is unfavorable, socioeconomic impacts would be singificant, seventeen (17) occupied homes occur on the tract.
Bread Springs #2	Low	Low confidence in the coal, natural environment, and socioeconomic data that is available for this tract, small business has expressed interest in obtaining this tract and in gathering additional coal data, no federal surface, general public attitude is unfavorable, socioeconomic impacts are expected to be minimal, no surface occupants.
Gamerco #1 (HC)	Medium	High quantity and quality of surface mineable coal, production potential moderate, transportation to the AT and SF railroad is less than five miles, no federal surface, some impacts to air quality, general public attitude is favorable, socioeconomic impacts are expected to be moderate, two (2) occupied homes occur on the tract.

TABLE A-3-2 (Concluded)

Tract	Summary Ranking	Rationale
Gamerco #1 (LC)	Medium	Low confidence in the quantity and quality of the surface mineable coal, moderate production potential due to the close proximity of Carbon Coal's existing mine and transportation is in place, no federal surface, some impacts to air quality, general public attitude is unfavorable, socioeconomic impacts are expected to be moderate, two (2) occupied homes occur on the tract.
Gamerco (UG) (LC)	Medium	Low confidence in the quantity and quality of the underground mineable coal, moderate production potential due to the close proximity to Carbon Coal's existing mine and transporation is in place, no federal surface, general public attitude is unfavorable, socioeconomic impacts are expected to be significant, thirty five (35) occupied homes occur on this tract.
Samson Lake #1	Medium	Low confidence in the quantity and quality of the underground mineable coal, moderate production potential due to the close proximity to Carbon Coal's existing mine and transportation is in place, primarily private surface, some impacts to water resources, general public attitude is favorable, socioeconomic impacts are expected to be moderate, thirty three (33) occupied homes occur on this tract.
Samson Lake #2	Medium	Moderate confidence in the quantity and quality of the surface mineable coal, production potential is moderate, due to the close proximity of Carbon Coal's existing mine and transportation is in place, some impacts to air quality, general public attitude is favorable, socioeconomic impacts are expected to be minimal, fifteen (15) occupied homes occur on this tract.

APPENDIX A-4

FEDERAL LAWS AND REGULATIONS AFFECTING COAL DEVELOPMENT

Resource	Popular Name	Law/Regulation/ U.S. Code Citation	Purpose/Major Relevance
	National Environmental Policy Act of 1969	91-190; 42 U.S.C. 4321	Makes environmental protection part of the mandate of every federal agency. Requires impact statement for major federal actions with potentially significant impacts.
			Provides legislative authority to control energy development on environmental grounds. Impact statement proces must be integral part of coal leasing system.
Air Quality	Clean Air Act Amendments of 1977	95-95; 42 U.S.C. 7401	Establishes requirements for areas failing to attain National Ambient Air Quality Standards (NAAQS). Provides for prevention of significance deterioration of areas where air is cleaner than NAAQS. May require a federal permit where conflicts with coal development exist. Modifies 1970 air act provisions regarding federal facilities, enforcement strategies, coal utilization impacts, and inter-state air pollution.
			May make certain coal lands off-limits for development. Limits industrial developments within and adjacent to areas exceeding NAAQS and areas preserving clean air quality. Reduces commercial attractiveness of low-sulfur Western coal as the new source standard changed to percent emissions reduction.
		30 CFR 817.95 (OSM)	Requires underground operator to employ fugitive dust control measures.
		30 CFR 784.26 (OSM)	Requires operator to establish monitoring systems for evaluation of dust control programs.
Topography, Geology and Soils		43 CFR 3465 (BLM)	Operators will use mining methods to prevent or control surface subsidence to maintain value and use of surface lands. Disturbed areas will be contoured and regulated after exploration.
		30 CFR, Part 816	Permanent Program Performance Standards — Surface Mining Activities.
		30 CFR, Sections 816.21 through 816.25	Topsoil removal, storage, redistribution, and soil amendements.

FEDERAL LAWS AND REGULATIONS AFFECTING COAL DEVELOPMENT (CONTINUED)

Resource	Popular Name	Regulation/Law/ U.S. Code Citation	Purpose/Major Relevance
Topography, Geology and Soils (Continued)		30 CFR, Section 816.41 through 816.57	Hydrologic balance, sediment control, impoundments, acid spoils and stream buffer zones.
		30 CFR, Sections 816.71 through 816.74	Disposal of excess spoil material.
		30 CFR, Sections 816.101 through 816.106	Backfilling, grading, and rill stablization.
		30 CFR, Sections 816.111 through 816.117	Revegetation.
		Department of Interior Policy	The Minerals Management Service will determine priority of development between coal, oil, and gas. Future uranium mineral claimants will coordinate with coal lessee. Unresolved conflicts will be settled in court.
Mineral Resources	Mining and Minerals Policy Act of 1970	91-631; 43 U.S.C. 21	Declares Congressional Mineral Policy.
			Provides broad, general principles for mineral resource development.
	Noise Control Act of 1972	92-574; 42 U.S.C. 4901	Requires publication of information on limits of noise required to protect pubic health and welfare. Preempts local control of railroad equipment and yard noise emissions.
			Regulations may be proposed to control coal mining areas and activities.
	Resources Conservation and Recovery Act of 1976	94-580; 42 U.S.C. 6901	Establishes guidelines for collection, transport, separation, recovery, and disposal of solid waste. Creates major federal hazardous waste regulatory program. Provides assistance to establish state or regional solid waste plans.
			Mining locations may be affected by EPA regulations governing disposal of coal mining wastes. Coal industry faced with stringent permit requirements if coal wastes classified by EPA as hazardous.

FEDERAL LAWS AND REGULATIONS AFFECTING COAL DEVELOPMENT (CONTINUED)

Resource	Popular Name	Regulation/Law/ U.S. Code Citation	Purpose/Major Relevance
Paleontology		16 U.S.C. 431-433	Collection of vertebrate fossils prohibited.
	Federal Land Policy and Management Act Section 102 (a) (8)	43 U.S.C. 1701 (a) (8)	It is BLM policy to determine mitigation or protection stipulations for paleontology on a case-by-case basis. Clearances will be required for all surface-disturbing activities on coal tracts to avoid unnecessary destruction or disruption of fossils and collecting sites. Important sites will be salvaged.
	Antiquities Act of 1906	59-209; 16 U.S.C. 431	Regulates antiquities excavation and collection (including fossil remains). Protects historical values on public land. Mitigates potential harm to historical, archaeological, and paleontological resources.
	Archaeological and Historical Preservation Act of 1974; Archaeological Salvage Act	93-291, 86-523; 16 U.S.C. 469	Provides for recovery of data from areas to be affected by federal actions. Provides for preservation of data (including relics and specimens) at every federal construction project. Mitigates potential harm to historical, archaeological, and paleontological resources. Mitigates potential harm to historical and archaeological resources.
Water Resources	Clean Water Act of 1977	95-217; 33 U.S.C. 1251	Establishes effluent limitations for new and existing industrial discharges into U.S. waters. Limitations set for public treatment discharges; with pretreatment by industrial users. Provides mechanism to restore and maintain integrity of the nation's waters. May reduce development options in areas where antidegradation policy restricts discharges into high quality waters. Treatment facilities in areas with rapidly expanding infrastructures must meet water quality standards. Effluent standards apply to coal mining point sources.

APPENDIX A-4

FEDERAL LAWS AND REGULATIONS AFFECTING COAL DEVELOPMENT (CONTINUED)

Resource	Popular Name	Regulation/Law/ U.S. Code Citation	Purpose/Major Relevance
Water Resources (Continued)	Safe Drinking Water Act of 1977	95-190; 42 U.S.C. 300	Establishes mechanism for National Primary Drinking Water Standards.
			EPA conducting study of the impacts of pits, ponds, lagoons, etc. on underground water supplies for public water systems.
		30 CFR 817.42 (OSM)	Restricts pollutant discharge.
		30 CFR 817.45 150-176 (OSM)	Amount of sediment produced will be minimized by conformance.
		30 CFR 817.54 (OSM)	Disrupted water supplies will be replaced.
		30 CFR 817.121 (OSM)	Mining will be conducted to minimize surface damage.
	Federal Water Pollution Control Act of 1972, as amended	33 U.S.C. 1251 et. seq.	Establishes water quality standards adopted by N.M. Water Quality Control Commission and approved by Environmental Protection Agency.
Vegetation	Surface Mining Control and Reclamation Act of 1977	U.S.C. 1265 (b) (19)	Diverse and permanent vegetative cover capable of self-regeneration at least equal in extent to natural vegetation will be established on affected areas.
	Soil and Water Resources Conservation Act of 1977	95-192; 16 U.S.C. 2001	Requires appraisal by Secretary of Agriculture of information and expertise on conservation and use of soils, plants, woodlands, etc.
			Provides opportunity for expanded data base.
		30 CFR 817.13 (OSM)	Exposed underground openings will be managed to ensure safety of people and livestock.
		30 CFR 817.54 (OSM)	Disrupted water supplies will be replaced.

FEDERAL LAWS AND REGULATIONS AFFECTING COAL DEVELOPMENT (CONTINUED)

Resource	Popular Name	Regulation/Law/ U.S. Code Citation	Purpose/Major Relevance
Wildlife	Bald Eagle Protection Act of 1969, as amended	86-70; 16 U.S.C. 668	Protects bald and golden eagles. May make certain coal lands off-limits for development.
	Endangered Species Act of 1973; as amended	93-205; 16 U.S.C. 1531	Protects endangered and threatened species and critical habitat form federal activities. Requires prior consultation with Fish and Wildlife Service. May make certain coal lands unsuitable for development.
	Fish and Wildlife Coordinations Act of 1934.	85-624; 16 U.S.C. 661	Required consultation about water resource development actions which might affect fish or associated wildlife resource. Mitigates potential federal coal development impacts.
		30 CFR 817 (OSM)	Requires restoration of soils and vegetation allows wildlife to repopulate area upon completion of mining and removal of surface facilities.
	Migratory Bird Treaty Act of 1981	16 U.S.C. 703-711; 40 Stat. 755	Regulates the taking, selling, etc., of birds, the nests, eggs or parts. Disturbance of nests or parts. Disturbance of nests can be prosecuted under this law.
Cultural Resources	Historic Preservation Act of 1966	89-665; 16 U.S.C. 470 See also 94-429; 16 U.S.C. 1609	Establishes system of classifying properties on or eligible for inclusion on Historic Register. Mandates federal agency consultation with Advisory Council and State historic preservation officers.
			MItigate potential harm to historical and archaeological values.
	Antiquities Act of 1906		Refer to Paleontology
	Archaeological and Historical Preservation Act of 1974;		Refer to Paleontology
		16 U.S.C. 469	A lessee will be required to carry out intensive field inventories of cultural resources on uninventoried portions of the areas that may be affected by lease-related activities, and develop mitigation plans that include, as appropriate, pro-

APPENDIX A-4

FEDERAL LAWS AND REGULATIONS AFFECTING COAL DEVELOPMENT (CONCLUDED)

Resource	Popular Name	Regulation/Law/ U.S. Code Citation	Purpose/Major Relevance
Cultural Resources (Continued)			visions for data recovery, curation, detailed recordation, stabilization, and relocation to provide appropriate levels of protection from adverse effects for specific properties.
	Archaeological Resources Protection Act of 1979	96-95	Protects archaeological resources on public land and Indian land.
	Title V, Chaco Culture National Historical Park	96-550	Enlarges Chaco Canyon Nation Monument and changes its name to Chaco Culture National Historical Park. Establishes 33 Chaco Culture Archeological Protection Sites and provides legal guidance for protection.
Visual Resource Management		30 CFR 717.14 (a) (OSM)	Disturbed work areas will be regraded to approximate original contour upon completion of Mining.
		30 CFR 817.111-117 (OSM)	Revegetation requirements.
Wilderness	Federal Land Policy and Management Act	43 U.S.C. 1782	Access across pubic lands under review for wilderness is granted by the Secretary only when it would not impair suitability of the area for that designation.
Land Uses		43 U.S.C. 1712	Valid existing rights will be identified and protected in BLM Land-Use Plans.
Transportation		30 CFR 817.124 (OSM)	Rights-of-Way will be protected.
Social and Economic Factors	Mineral Leasing Act of 1920, as amended	30 U.S.C. 191	Fifty percent of royalities from Federal coal will be returned to the State.
American Indian Concerns	American Indian Religious Freedom Act	Public Law No. 95-341	Requires consideration of Indian religious practices.
	"Guidelines for Human Burials"		Provides guidelines in handling and relocating human burials.

APPENDIX A-5

STATE LEGISLATION AND REGULATIONS AFFECTING COAL DEVELOPMENT

Legislation	Purpose/Relevance
New Mexico Air Quality Control Regulation 201	Specifies standards not to be equalled or exceeded.
New Mexico Air Quality Standards and Regulation, Section 672	Coal handling equipment will be equipped to prevent particulate matter from becoming airborne. Haul roads will be sprayed to prevent particulate matter from becoming airborne.
State of New Mexico Senate Memorial 31	Mining operators on state lands will notify the State of New Mexico, Dept. of Finance and Administration, Office of Cultural Affairs, if important fossils are found.
N.M. Stat. Annot. (1953 Compil.), Section 72-2-1	The State Engineer has general supervision of waters of the state and of the measurement, appropriation and distribution thereof. Other statutes administered by the State Engineer that affect coal development are: Section 69-3-6 N.M.S.A. 1978 Comp. Any person drilling a mine lode discovery hole or mine drill hole to a depth of 10 feet more, and encounters a water body or water-bearing stratum shall plug and report to the State Engineer. Section 72-12-A N.M.S.A. 1978 Comp. Any person desiring to engage in mine dewatering in a declared underground water basin shall apply to the State Engineer for a permit.
New Mexico Surface Mining Act of 1979; New Mexico Coal Surface Mining Commission, Rule 80-1, part 20;	Full range of coal mining protection including, diverse and permanent vegetative cover capable of self-regeneration at least equal in extent to natural vegetation will be established on affected areas.
Rule 80-1, part 20-41 et seq.	Surface coal mining operations will be planned and conducted to minimize adverse changes in water quality and quantity.
N.M. Regulation 563, as amended	The New Mexico State Department of Game and Fish is responsible for state endangered species and subspecies.
New Mexico Severance Tax Act	Tax of $.38/ton will be paid on steam coal.

APPENDIX A-6

SUMMARY OF SITE SPECIFIC IMPACTS TO
RESOURCE VALUES AND LAND USES BY PRLA NUMBER

Lease No. and Company	Legal Description	Total Acreage	Surface Ownership (Acres)					Type of Mine	Cultural Resources				Potential Chacoan Roads on PRLAs (kms)		Paleontology				ACEC Occurrence	Indian Occupancies[a] (number of sites)	Wilderness Study Areas		Grazing Allotments (portions only - by Allotment No.)	AUMs
			Public	State	Indian	Indian Withdrawal	Private		Percent of Lease Inventoried	Predicted No. of Sites On Lease	National Register Recommendations Eligible	National Register Recommendations Pending	Projected Segments	Imaged Segments	No. of Sites (Class) I	II	III	IV			Acreage	Percent of PRLA		
Arch Minerals																								
NM-3752	T. 23 N., R. 12 W., Sec. 17, Lot 5, W½SW¼; Sec. 18, Lots 2, 3, 4, 6, SE¼NE¼, SE¼NW¼, E½SW¼, SE¼; Sec. 19, All; Sec. 20, Lots 4, 5, 6, 9-16; Sec. 21, Lots 1, 2, 3, 6, 7, 8, 9-16; Sec. 22, All; Sec. 23, Lots 1-8, S½; Sec. 25, SE¼.	3,760	3,085	0	515	160	0	Surface	73	35	21	2	2.30	0	0	14	60	107		1 (Abandoned)			6009, 6010, 6012	341
NM-3753	T. 23 N., R. 12 W., Sec. 9, E½; Sec. 10, Lots 1-8, E½; Sec. 13, All; Sec. 14, Lots 1-8, N½; Sec. 15, Lots 1-8, N½.	2,951	1,159	672	800	0	320	"	16	99	0	0	0	0	1	8	60	130		0			6010, 6012	240
NM-3754	T. 23 N., R. 12 W., Sec. 26, NW¼, N½SW¼, NW¼SE¼; Sec. 27, All; Sec. 28, All; Sec. 29, All; Sec. 30, Lots 1, 2, 3, 4, E½, E½W½; Sec. 33, NE¼NW¼, W½W½; Sec. 35, SE¼SE¼.	3,075	1,555	0	0	1,520	0	"	31	40	2	0	0	0	0	2	15	25		0			6012	224
NM-3755	T. 22 N., R. 11 W., Sec. 4, SW¼; Sec. 6, All; Sec. 8, All; Sec. 10, NE¼, NW¼, SE¼; Sec. 12, All.	2,588	1,468	0	1,120	0	0	"	25	n/a	10	5	1.50	0.10	h/	h/	1	1		0			6010, 6013, 6016	268
NM-3918	T. 22 N., R. 10 W., Sec. 17, All; Sec. 18, Lots 1-4, E½, E½W½; Sec. 19, Lots 1-4, E½, E½W½; Sec. 22, All; Sec. 23, All; Sec. 24, All; Sec. 25, All.	4,477	4,477	0	0	0	0	"	43	30	9	6	5.85	0.90	0	0	0	0		6 (1 Abandoned, 1 Currently Unused)	985	22	6013	401
NM-3919	T. 22 N., R. 10 W., Sec. 5, Lots 1-4, S½N½, S½; Sec. 6, Lots 1-7, S½NE¼; SE¼NW¼, E½SW¼, SE¼; Sec. 7, Lots 1-4, E½, E½W½; Sec. 8, All; Sec. 9, All; Sec. 14, All; Sec. 15, All.	4,478	4,478	0	0	0	0	"	29	57	2	0	6.30	0	2	22	136	176		0	3,156	70	6010, 6013	315
NM-8745	T. 22 N., R. 10 W., Sec. 20, SE¼NW¼; Sec. 21, E½, NW¼.	520	320	0	200	0	0	"	92	4	1	1	0	1.00	0	0	0	0		0			6013	43
Eastern																								
NM-3834	T. 24 N., R. 12 W., Sec. 20, All; Sec. 21, All; Sec. 22, All; Sec. 23, All; Sec. 24, All; Sec. 25, All; Sec. 26, All.	4,804	4,591	0	213	0	0	e/	0	n/a	0	0	0	0	0	0	21	19	X	0	4,591	95	6008, 6010	302
NM-3835	T. 23 N., R. 12 W., Sec. 1, All; Sec. 2, SE¼; Sec. 3, Lots 5-16, SW¼; Sec. 4, All; Sec. 5, Lots 5-12; Sec. 11, All; Sec. 12, All; Sec. 24, Lots 1-8, S½.	4,500	1,325	2,215	960	0	0		14	28	2	0	1.75	0	0	6	20	46	X	0			6010	455
NM-3836	T. 23 N., R. 11 W., Sec. 15, All; Sec. 17, All; Sec. 18, Lots 1-4, E½, E½W½; Sec. 19, Lots 1-4, E½, E½W½; Sec. 20, All; Sec. 21, All; Sec. 22, All; Sec. 23, All.	5,110	3,830	1,280	0	0	0		47	28	8	2	9.90	0	0	0	0	0		0			6010	483
NM-3837	T. 23 N., R. 11 W., Sec. 24, All; Sec. 25, All; Sec. 26, All; Sec. 27, All; Sec. 28, All; Sec. 33, All; Sec. 34, All; Sec. 35, All.	5,120	4,800	0	320	0	0		41	20	10	1	0	3.20	0	0	0	0		0			6010	593
NM-3838	T. 24 N., R. 12 W., Sec. 27, All; Sec. 28, All; Sec. 29, All; Sec. 31, All; Sec. 33, All; Sec. 34, All; Sec. 35, All.	4,787	4,321	0	466	0	0		0	7	0	0	0	0	0	6	17	22	X	0	3,115	65	6008, 6010	320
NM-6801	T. 24 N., R. 12 W., Sec. 19, All; T. 24 N., R. 13 W., Sec. 19, Lots 1-4, E½, E½W½, Sec. 20, All; Sec. 21, All; Sec. 22, All; Sec. 23, All; Sec. 24, All.	4,394	43	0	4,351	0	0		0	46	0	0	2.00	0	0	3	34	35	X	1 (Currently Unused)	43	1	6008 (Navajo Indian Irrigation Project)	358
NM-6802	T. 23 N., R. 12 W., Sec. 6, Lots 8-15.	340	340	0	0	0	0		0	3	0	0	0	0	0	0	3	8	X	0			6009	23

Lease No. and Company	Legal Description	Total Acreage	Surface Ownership (Acres) Public	State	Indian	Indian Withdrawal	Private	Type of Mine	Cultural Resources: Percent of Lease Inventoried	Predicted No. of Sites On Lease	National Register Recommendations: Eligible	Pending	Potential Chacoan Roads on PRLAs (kms): Projected Segments	Imaged Segments	Paleontology: No. of Sites (Class) I	II	III	IV	ACEC Occurrence	Indian Occupancies[a] (number of sites)	Wilderness Study Areas: Acreage	Percent of PRLA	Grazing Allotments (portions only - by Allotment No.)	AUMs
Eastern (Cont'd)																								
NM-6803	T. 23 N., R. 10 W., Sec. 18, Lots 1-4, E½, E½W½; Sec. 19, Lots 1-4, E½, E½W½; Sec. 30, Lots 1-4, E½, E½W½; Sec. 31, Lots 1-4, E½, E½W½; T. 23 N., R. 11 W., Sec. 10, All; Sec. 11, All; Sec. 13, All, Sec. 14, All.	5,121	4,961	0	160	0	0	[c]	50	46	22	3	3.60	2.25	[h]	3	5	[h]		1 (Abandoned)			6010, 6011	458
NM-6804	T. 22 N., R. 10 W., Sec. 3, Lots 1-4, S½N½, S½; Sec. 4, Lots 1-4, S½N½, S½; Sec. 10, W½.	1,602	1,602	0	0	0	0		0	45	0	0	2.05	0	0	7	12	30		0	1,214	76	6010, 6013	106
NM-7235	T. 23 N., R. 12 W., Sec. 25, NE¼.	160	0	0	0	160	0		100	2	0	0	0	0	0	0	0	0		0			6010	21
Kin-Ark																								
NM-11916	T. 24 N., R. 13 W., Sec. 25, All; Sec. 26, All; Sec. 27, All; Sec. 28, E½; Sec. 35, All.	2,880	320	0	2,560	0	0	Underground	17	13	0	0	2.90	0	0	1	9	5	X	0	320	11	6008 (Navajo Indian Irrigation Project)	158
Thermal-Peabody																								
NM-8715	T. 20 N., R. 7 W., Sec. 3, S½; Sec. 5, Lots 1-4, S½N½; Sec. 10, All; Sec. 11, All.	1,921	640	0	960	321	0	Surface	33	8	0	0	1.60	0	[h]	[h]	1	3		1			6015, 6018, 6019	172
NM-8717	T. 20 N., R. 5 W., Sec. 35, S½, NE¼, E½NW¼, SW¼NW¼.	600	320	0	280	0	0	"	53	14	0	0	0	0	0	0	0	0		0			6023	48
NM-8128	T. 21 N., R. 8 W., Sec. 8, SE¼SE¼; Sec. 9, S½; Sec. 10, S½; Sec. 15, All; Sec. 17, E½; Sec. 22, W½; Sec. 25, SW¼; Sec. 26, W½, SE¼, SW¼NE¼; Sec. 27, Lots 1-4, N½, SE¼; Sec. 34, Lots 1-8, NE¼, N½SE¼; Sec. 35, All.	4,499	1,333	680	1,040	1,446	0	"	18	49	2	0	0	0	0	0	12	19		6 (1 Ancillary, 1 Seasonal Use)			6017, 6018	466
NM-8129	T. 22 N., R. 9 W., Sec. 19, Lot 4, SE¼SW¼; Sec. 29, NW¼, W½NE¼; Sec. 30, Lots 1-4, E½, E½W½; Sec. 33, S½NE¼, E½SW¼, SE¼; Sec. 34, S½NW¼, SW¼.	1,520	1,520	0	0	0	0	"	0	5	0	1	0.35	1.00	0	4	10	5		0			6013	155
NM-8130	T. 20 N., R. 7 W., Sec. 6, All; Sec. 7, NE¼; Sec. 8, SW¼; T. 20 N., R. 8 W., Sec. 1, All; Sec. 2, Lots 1-4, SE¼NW¼, S½NE¼; Sec. 3, Lots 1, 2 Sec. 12, NE¼.	2,133	973	0	280	880	0	"	38	7	1	0	1.60	0	[h]	1	2	7		4 (1 Ancillary)			6018	232
NM-9764	T. 22 N., R. 10 W., Sec. 21, E½SW¼, SW¼SW¼; Sec. 28, N½NW¼, NW¼NE¼.	240	40	0	200	0	0	"	0	3	0	1	0.40	0.15	0	0	0	0		0			6013	23
NM-11670	T. 21 N., R. 8 W., Sec. 7, Lots 3, 4, E½SW¼; Sec. 17, W½; Sec. 18, All.	1,119	639	480	0	0	0	"	0	0	0	0	0	0	[h]	[h]	[h]	1		0			6017	130
United Electric																								
NM-585	T. 19 N., R. 5 W., Sec. 3, S½; Sec. 4, Lots 1, 2, 3, 4, S½N½, S½; Sec. 5, S½; Sec. 6, Lots 6, 7, E½SW¼, SE¼; Sec. 7, Lots 1, 2, E½NW¼, NE¼; Sec. 8, N½; Sec. 9, N½N½, SW¼NW¼, SE¼NE¼, S½S½, NW¼SW¼, NE¼SE¼, SW¼NE¼, SE¼NW¼, NE¼SW¼.	2,811	2,048	0	763	0	0	Surface	100	33	22	1	0	0	0	0	0	0		5 (1 Ancillary)			6023	203

Notes: [a] Unless otherwise specified by parenthetical note, these sites are currently inhabited.
[b] This estimate applies to the Logical Mining Unit that includes NM-3752, NM-3753, and NM-3754.
[c] This estimate applies to the Logical Mining Unit that includes NM-3755, NM-3918, NM-3919, and NM-8745.
[d] This estimate applies to the Logical Mining Unit that includes NM-3834, NM-3835, NM-3836, NM-3837, NM-3838, NM-6801, NM-6802 and NM-6803.
[e] All PRLAs except NM-6802 involved in undergraound mining. NM-3835, NM-3836, NM-3837, NM-3838 and NM-6802 involved in surface mining.
[f] This estimate applies to the Logical Mining Unit that includes NM-8715 and NM-8717.
[g] This estimate applies to the Logical Mining Unit that includes NM-8128, NM-8129, NM-8130, NM-9764, and NM-11670.
[h] Data incomplete for these PRLAs.

APPENDIX A-7

BIRDS OF PREY HABITAT WITHIN THE PRLA AREA

BLM Nest Inventory Number	Species	Applicable Unsuitability Criteria Number	Acres Needed for Protection	PRLA No.	Type of Mine
4A-4B	Ferruginous Hawk	14	220	NM 3835	Surface
5	Ferruginous Hawk	14	640	NM 3919	Surface
6A-6B	Ferruginous Hawk	14	640	NM 3919	Surface
22, 24	Ferruginous Hawk	14	165	NM 11916	Underground
20	Prairie Falcon	13	160	NM 3834	Underground
33-34	Ferruginous Hawk	14	280	NM 3834	Underground

APPENDIX A-8

BIRDS OF PREY HABITAT ON COAL TRACTS OUTSIDE THE PRLA AREA

BLM Nest Inventory Number	Species	Applicable Unsuitability Criteria Number	Acres Needed for Protection	Tract	Type of Mine
19	Ferruginous Hawk	14	115	Bisti #4	Surface
14	Golden Eagle	11	75	Johnson Trading Post	Surface
25 a/	Ferruginous Hawk	14		Hospah	Surface
29	Golden Eagle	11	280	Nageezi	Underground

a/ Private surface and minerals.

APPENDIX A-9

ACREAGES INCLUDED IN THE NAVAJO LAND SELECTION

THE NAVAJO NATION
WINDOW ROCK, ARIZONA 86515

PETER MacDONALD
CHAIRMAN

The Honorable James G. Watt
Secretary of the Interior
Department of the Interior
C Street between 18th & 19th Streets, N.W.
Washington, D.C. 20240

Subject: Selection of Lands under
P.L. 93-531, as amended.

Dear Secretary Watt:

The Navajo Tribe, pursuant to authority contained in Section 11 of P.L. 93-531, as amended (25 USC Section 640d-10), in consultation with the Navajo and Hopi Indian Relocation Commission, hereby selects for transfer to the Navajo Tribe the lands under the jurisdiction of the Bureau of Land Management within the State of New Mexico as described in Attachment A. This selection includes all surface and subsurface rights to such lands subject only to valid existing rights as of the date of selection.

This selection is made subject to the condition that where any of such lands are subject to existing preferential coal lease applications wherein leases for the mining of coal have not yet been executed by the United States, in the event any such coal lease is executed by the United States and/or the Navajo Tribe after the date of this selection, the royalties and other benefits under such coal lease shall inure the benefit of the Navajo Tribe to be used solely for the benefit of Navajo families residing on Hopi-partitioned lands as provided in the above Act. In the event that this condition cannot be honored as to all or any part of the lands selected we reserve the right to withdraw or amend the selection in whole or in part.

We request that all lands selected herein be withdrawn from disposition under the public land laws pending final disposition of this selection.

We further request that this selection be acted upon at the secretarial level in the first instance and that the Navajo Tribe and the Navajo and Hopi Indian Relocation Commission be given opportunity to participate in discussion of any problems which may be involved and in the resolution of such problems before any decision is made.

Sincerely,

Peter MacDonald, Chairman
Navajo Tribal Council

NAVAJO-HOPI INDIAN
RELOCATION COMMISSION:

Chairman

Commissioner

Commissioner

LEGAL DESCRIPTION OF THE NEW MEXICO BUREAU OF LAND MANAGEMENT LANDS LOCATED WITHIN THE PARAGON RANCH SELECTED BY THE NAVAJO TRIBE

Township 22 North, Range 10 West, NMPM		Acreage
Sec. 4	Lots 1,2,3,4; s½N½; 20 AC (±) within the NW Portion of the NW¼ SW¼	340.84
Sec. 5	All	640.90
Sec. 6	All	638.64
Sec. 7	19.75 AC (±) within the NW portion of Lot 1	19.75
Township 22 North, Range 11 West, NMPM		
Sec. 6	Lots 8 thru 15, Inclusive	334.12
Sec. 12	NW¼; N½ NE¼; SW¼ NE¼; 20 AC (±) within the NW portion of the SE¼ NE¼	300.00
Township 22 North, Range 12 West, NMPM		
Sec. 4	Lots 1,2; S½ NE¼; S½	479.28
Township 23 North, Range 10 West, NMPM		
Sec. 19	All	640.08
Sec. 20	All	640.00
Sec. 21	S½, 52 AC (±) within the NW¼	372.00
Sec. 28	N½, SW¼	480.00
Sec. 29	All	640.00
Sec. 30	All	640.72
Sec. 31	All	640.06
Sec. 33	All	640.06

Township 23 North, Range 11 West, NMPM		Acreage
Sec. 6	All	632.57
Sec. 7	Lots 1, 2; E½ NW¼; NE¼	316.76
Sec. 8	S½	320.00
Sec. 9	SE¼	160.00
Sec. 18	All	634.16
Sec. 19	Lots 1, 2, 3, 4; E½ W½; W½ E½	476.04
Sec. 20	E½ E½	160.00
Sec. 21	All	640.00
Sec. 22	S½, NW¼	480.00
Sec. 23	S½	320.00
Sec. 24	N½, SE¼	480.00
Sec. 25	NW¼, S½	480.00
Sec. 26	All	640.00
Sec. 27	All	640.00
Sec. 28	All	640.00
Sec. 33	All	640.00
Sec. 34	All	640.00
Sec. 35	All	640.00
Township 23 North, Range 12 West, NMPM		
Sec. 9	Lots 1, 2, 3, 4	170.32
Sec. 12	All	674.32
Sec. 13	All	666.65
Sec. 14	Lots 1 thru 8, Inclusive; NW¼	491.95
Sec. 17	Lots 1, 2, 7, 8, 9, 10, 12, 13	335.65

Township 23 North, Range 12 West, NMPM (Cont'd)		Acreage
Sec. 19	All	654.71
Sec. 20	All	662.30
Sec. 21	All	663.45
Sec. 22	All	661.31
Sec. 23	All	649.63
Sec. 24	All	650.20
Sec. 26	All	640.00
Sec. 28	All	640.00
Sec. 29	All	640.00
Sec. 30	All	635.32
Sec. 34	All	640.00
Township 24 North, Range 11 West, NMPM		
Sec. 31	Lots 3, 4; E½ SW¼	156.48
Township 24 North, Range 12 West, NMPM		
Sec. 25	All	687.48
Sec. 26	Lots 9 thru 16, Inclusive	343.33
Sec. 27	Lots 9 thru 16, Inclusive	342.98
Sec. 28	Lots 9 thru 16, Inclusive	343.10
Sec. 29	Lots 9 thru 16, Inclusive	341.10
Sec. 33	All	687.97
Sec. 34	All	684.11
Township 23 North, Range 11 West, NMPM		
Sec. 2	Lots 1, 2, 3, 4; S½ N½; S½	639.36
Sec. 3	Lots 1, 2, 3, 4; S½ N½; S½	638.58

Township 24 North, Range 11 West, NMPM		Acreage
Sec. 21	S½	320.00
Sec. 28	All	640.00
Sec. 33	N½	320.00
Sec. 34	All	640.00
Sec. 35	All	640.00
Township 23 North, Range 13 West, NMPM		
Sec. 14	S½ N½; S½	480.00
Sec. 23	All	640.00
Sec. 24	All	640.00
	TOTAL ACREAGE:	35,000.00

APPENDIX A-10

CRITERIA FOR ASSESSING LANDS UNSUITABLE FOR ALL OR CERTAIN STIPULATED METHODS OF COAL MINING

Criterion Number 1: All Federal lands included in the following land systems or categories shall be considered unsuitable: National Park System, National Wildlife Refuge System, National System of Trails, National Wilderness Preservation System, National Wild and Scenic Rivers System, National Recreation Areas, lands acquired with money derived from the Land and Water Conservation Fund, National Forests, and Federal lands in incorporated cities, towns, and villages.

Criterion Number 2: Federal lands that are within rights-of-way or easements or within surface leases for residential, commerical, industrial, or other public purposes. Federally owned surface shall be considered unsuitable.

Criterion Number 3: Federal lands affected by section 522(e)(4) and (5) of the Surface Mining Control and Reclamation Act of 1977 shall be considered unsuitable. This includes lands within 100 feet of the outside line of the right-of-way of a public road or within 100 feet of a cemetery, or within 300 feet of any public building, school, church, community or institutional building or public park or within 300 feet of an occupied dwelling.

Criterion Number 4: Federal lands designated as wilderness study areas shall be considered unsuitable while under review by the Administration and the Congress for possible wilderness designation. For any Federal land which is to be leased or mined prior to completion of the wilderness inventory by the surface management agency, the environmental assessment or impact statement on the lease sale or mine plan shall consider whether the land possesses the characteristics of a wilderness study area. If the finding is affirmative, the land shall be considered unsuitable, unless issuance of noncompetitive coal leases and mining on leases is authorized under the Wilderness Act and the Federal Land Policy and Management Act of 1976.

Criterion Number 5: Scenic Federal lands designated by visual resource management analysis as Class I (an area of outstanding scenic quality or high visual sensitivity) but not currently on the National Register of Natural Landmarks shall be considered unsuitable. A lease may be issued if the surface management agency determines that surface coal mining operations will not significantly diminish or adversely affect the scenic quality of the designated area.

Criterion Number 6: Federal lands under permit by the surface management agency, and being used for scientific studies involving food or fiber production, natural resources, or technology demonstrations and experiments shall be considered unsuitable for the duration of the study, demonstration or experiment, except where mining could be conducted in such a way as to enhance or not jeoparize the purposes of the study, as determined by the surface mangement agency, or where the pricncipal scientific user or agency gives written concurrrence to all or certain methods of mining.

Criterion Number 7: All districts, sites, building, structures, and objects of historic, architectural, archeological, or cultural significance on Federal lands which are included in or eligible for inclusion in the National Register of Historic Places, and an appropriate buffer zone around the outside boundary of the designated property (to protect the inherent values of the property that make it eligible for listing in the National Register) as determined by the surface management agency, in consultation with the Advisory Council on Historic Preservation and the State Historic Preservation Office shall be considered unsuitable.

Criterion Number 8: Federal lands designated as natural areas or as National Natural Landmarks shall be considered unsuitable.

Criterion Number 9: Federally designated critical habitat for threatened or endangered plant and animal species, and habitat for Federal threatened or endangered species which is determined by the Fish and Wildlife Service and the surface management agency to be of essential value and where the presence of threatened or endangered species has been scientifically documented, shall be considered unsuitable.

Criterion Number 10: Federal lands containing habitat determined to be critical or essential for plant or animal species listed by a state pursuant to state law as endangered or threatened shall be considered unsuitable.

Criterion Number 11: A bald or golden eagle nest or site on Federal lands that is determined to be active and an appropriate buffer zone of land around the nest site shall be considered unsuitable. Consideration of availability of habitat for prey species and of terrain shall be included in the determination of buffer zones. Buffer zones shall be determined in consultation with the Fish and Wildlife Service.

Criterion Number 12: Bald and golden eagle roost an concentration areas on Federal lands used during migration and wintering shall be considered unsuitable.

Criterion Number 13: Federal lands containing a falcon (excluding kestrel) cliff nesting site with an active nest and a buffer zone of Federal land around the nest site shall be considered unsuitable. Consideration of availability of habitat for prey species and of terrain shall be included in the determination of buffer zones. Buffer zones shall be determined in consultation with the Fish and Wildlife Service.

Criterion Number 14: Federal lands which are high priority habitat for migratory bird species of high Federal interest on a regional or national basis, as determined jointly by the surface management agency and the Fish and Wildlife Service, shall be considered unsuitable.

Criterion Number 15: Federal lands which the surface management agency and the state jointly agree are fish and wildlife habitat for resident specie of high interest to the state and which are essential for maintaining these priority wildlife species shall be considered unsuitable. Examples of such lands which serve a critical function for the species involved include:

(i) Active dancing and strutting grounds for sage grouse, sharp tailed grouse, and prairie chicken;

(ii) Winter ranges most critical for deer, antelope, and elk; and

(iii) Migration corridors for elk.

A lease may be issued if, after consultation with the state, the surface management agency determines that all or certain stipulated methods of coal mining will not have a significant long-term impact on the species being protected.

Criterion Number 16: Federal lands in riverine, coastal and special floodplains (100-year recurrence interval) on which the surface management agency determines that mining could not be undertaken without substantial threat of loss of life or property shall be considered unsuitable for all or certain stipulated methods of coal mining.

Criterion Number 17: Federal lands which have been committed by the surface management agency to use as municipal watersheds shall be considered unsuitable.

Criterion Number 18: Federal lands with National Resource Waters, as identified by states in their water quality managment plans, and a buffer zone of Federal lands 1/4 mile from the outer edge of the far banks of the water, shall be unsuitable.

Criterion Number 19: Federal lands identified by the surface management agency, in consultation with the state in which they are located, as alluvial valley floors according to the definition in § 3400.0-5(a) of this title, the standards in 30 CFR Part 822, the final alluvial valley floor guidelines of the Office of Surface Mining.

Reclamation and Enforcement when published, and approved state programs under the Surface Mining Control and Reclamation Act of 1977, where mining would interrupt, discontinue, or preclude farming, shall be considered unsuitable. Additionally, when mining Federal land outside an alluvial valley floor would materially damage the quantity or quality of water in surface or underground water systems that would supply alluvial valley floors, the land shall be considered unsuitable.

Criterion Number 20: Federal lands in a state to which is applicable a criterion (i) proposed by that state, and (ii) adopted by rulemaking by the Secretary, shall be considered unsuitable.

APPENDIX A-11

CULTURAL RESOURCE INVENTORY PROCEDURES AND CONSULTATION

In November, 1982 the Bureau of Land Management (BLM) released the Draft San Juan River Regional Coal Environmental Impact Statement (EIS) discussing the environmental, social and economic impacts of the proposed mining of 39 new competitive coal tracts in northwestern New Mexico. Subsequent to the release of this document, it was determined that additional inventory was needed to more accurately assess the impacts of mining on cultural resource values on 27 of these tracts. On June 19, 1983 the BLM began an in-house inventory to collect additional data on 18 of the highest priority tracts: Gallow Wash #1 and #2, Star Lake East #1, Star Lake East (Low Confidence), Johnson Trading Post, Bisti #4, La Plata #1, #2, #3, and #4, Samson Lake #1 and #2, Gamerco #1 and #2, Twin Buttes, Ta-ha-bah Well, Crownpoint Northeast, and Crownpoint East. The inventories conducted on the Twin Buttes and Crownpoint East tracts were only for a portion of these tract. The reduced acreage was determined according to the BLMs Branch of Solid Minerals most current information on coal resources.

Portions of the Lee Ranch Middle and Divide tracts were surveyed by the School of American Research. Other tracts in which the amount of available information is considered to be incomplete under the existing regulations and were not included in this inventory are Pinehaven, Lee Ranch East, Breadsprings #1 and #2, Hogback, Chico Wash South and Gamerco #2.

The goals of these inventories were three-fold: 1) to gather sufficient data to characterize cultural resources for all of the acreage overlying federal mineral estate; 2) to apply Unsuitability Criterion #7 (43 CFR 3461.1(g)(1) to sites located within the tract; and 3) to the degree possible, assess overall suitability of the tract for leasing based on the potential for severe conflicts with cultural resource values. To achieve these goals, sample inventory procedures were used.

The School of American Research previously conducted a large amount of inventory in the vicinity of the Divide and Lee Ranch Middle tracts. Drawing upon this experience, Beal (1983) devised a predictive model based on land forms. The tracts were then stratified according to land forms and a judgemental sample was defined, biased toward land forms where cultural resources are most likely to occur: 50 percent coverage of ridgetop, hilltop, and elevated areas, 15 percent coverage of slopes and benches, and only incidental coverage of valley bottoms, drainages, and floodplains. The survey areas were inventoried to BLM Class III standards.

Little existing information was available for the tracts inventoried by the BLM archaeologists. Because of this, no attempt was made to stratify the inventory area. Instead an unbiased sample of interval transects was surveyed. Survey transects were placed at 150 to 200 meter intervals, designed to achieve a minimum of 10 to 15 percent coverage. Although this percentage is relatively small, a much larger percentage of the total sites potentially unsuitable for coal leasing within each tract were probably recorded. Such sites are generally apt to be larger in area and visually more prominent from a distance. In the course of inventory, transect coverage was supplemented by reconnaissance where

potentially unsuitable sites were suspected or observed. However, this supplemental reconnaissance was not systematic, and in no context should this inventory be considered to represent intensive (BLM Class III) coverage of these tracts.

Field reports providing additional detail about methods and results of these projects are on file at the BLM Farmington Resource Area Office. These reports are:

BLM Competitive Coal Tract Cultural Resource Inventory Intrim Report, Bisti #4 Tract, by John Roney and John Stein.

BLM Competitive Coal Tract Cultural Resource Inventory Intrim Report, Crownpoint East Tract, by John Roney.

BLM Competitive Coal Tract Cultural Resource Inventory Intrim Report, Gallo Wash #1 Tract, by John Roney and Chris Kincaid.

BLM Competitive Coal Tract Cultural Resource Inventory Intrim Report, Gallo Wash #2 Tract, by Sam Ball and John Roney.

BLM Competitive Coal Tract Cultural Resource Inventory Intrim Report, Gamerco Tract, by Andrew Fowler.

BLM Competitive Coal Tract Cultural Resource Inventory Intrim Report, Johnson Trading Post Tract, by Andrew Fowler.

BLM Competitive Coal Tract Cultural Resource Inventory Intrim Report, La Plata #1, #2, #3, and #4 Tracts, by Lou Ann Jacobson.

BLM Competitive Coal Tract Cultural Resource Inventory Intrim Report, Sampson Lake Tract, by T. J. Ferguson.

BLM Competitive Coal Tract Cultural Resource Inventory Intrim Report, Star Lake East Tract, by T. J. Ferguson.

BLM Competitive Coal Tract Cultural Resource Inventory Intrim Report, Tah-ha-bah Tract, by T. J. Ferguson.

BLM Competitive Coal Tract Cultural Resource Inventory Intrim Report, Twin Buttes Tract, by Andrew Fowler.

A Predictive Sample Survey in the Southern San Juan Basin, Preliminary Report, by John D. Beal, School of American Research.

A total of 293 previously unrecorded components were recorded during the inventories:

Lithic	53	18.1%
Anasazi	54	18.4%
Navajo	145	49.5%
Anglo/Hispanic	10	3.4%
Unknown	32	10.6%
Total	294	100.0%

Due to time constraints and the limited goals of this inventory, no testing was done to determine the nature and extent of subsurface deposits. This limitation led to a conservative approach in assessing eligibility for the National Register of Historic Places (NRHP). In cases where the presence of subsurface depostis may have been the determining factor in site eligibility, sites were automatically recommended as eligible.

For Navajo sites our evaluation centered around whether or not the site could be most profitabily investigated by ethnographic/ethnohistoric or archaeological techniques. For example, if the site were post WWII and near an occupied outfit, the assumption was made that ethnohistoric investigation would yield better more useful data than archaeological investigation; the site was therefore not recommended as eligible for the NRHP. This assumption was checked where possible by contracting local residents.

If a Navajo site contained cultural material suggesting a date around the turn of the century or earlier, the assumption was made that archaeological techniques would be more profitable, and these sites were recommended as eligible. This kind of evaluation was made exclusive of any reference to the quality, quantity and preservation of features on the site itself.

Pre-historic sites were evaluated on the basis of surface appearance of features, variety of artifactual remains, potential depth, complexity, integrity and uniqueness of this site with respect to others in the same vicinity.

Under the procedures, 157 components are identified as potentially eligible for the National Register of Historic Places. However, almost all of these are potentially eligible because they may yield information important in history or prehistory (criterion d). Consequently potential adverse impacts could be mitigated under a mine plan for coal development through data recovery. Therefore, these projects may be considered exceptions to Unsuitability Criterion 7.

Two new areas were found which are recommended as unsuitable under Criterion #7. One of these is a Chacoan shrine (LA44728,a) with standing masonry walls. This site is a well preserved example of a highly unusual form of Anasazi architecture and clearly warrants in-situ preservation. An area of 160 acres is recommended as unsuitable to preserve the site. In addition, special stipulations may be needed to prevent further reduction of the fragile, unstabilized masonry walls during mining operatons.

The other area recommended as unsuitable is a 280 acre parcel which contains a large pithouse village dating to Basketmaker III and Early Pueblo I times, as well as several segments of the prehistoric South Road.

After completion of the inventories the BLM provided copies of the field reports to the Bureau of Indian Affairs, as a cooperating agency and to the State Historic Preservation Officer. Following a review period, a meeting was held with each of these parties to discuss the adequacy of the information base, eligibility of the sites that were found, and application of Unsuitability Criterion #7. This EIS reflects the agreements which were reached, subject to the following concerns.

First, it is possible that some cultural resources will be of special significance to local Native American people, thus deriving importance from factors which are not apparent during a standard archaeological resources inventory. Presently three such situations are known in the San Juan Basin. To address this possibility, the lessee will conduct an ethnographic survey specifically directed toward identification of properties which have special significance to local Native American people, which should be considered further in the light of Federal historic preservation mandates. Results of this survey will be used in the develoment of special tract specific lease stipulations.

The BLM also recognizes that eventual mining on the coal tracts would affect a sizeable fraction of the archeological sites in the EIS Region. Even though adverse effects would be mitigated through state-of-the-art data recovery, a large number of sites would become unavailable for future research. This is considered acceptable because other, similar properties exist outside the proposed coal leasing tracts and will not be affected. To ensure that similar cultural resources are preserved outside the coal leasing tracts the BLM is compiling a list of equivalent sites arranged by site types. This listing will be added to the BLMs land use planning data base and provided to other surface managing agencies, to allow monitoring of the pool of equivalent properties as other surface disturbing projects are proposed. If the numbers of a particular class of sites dwindle to critical levels, specific properties could then be identified for preservation.

The New Mexico State Historic Preservation Officer has expressed concern that buried sites may not be readily identified during intensive (Class III) inventories required for mine plan preparation. This is a problem because buried sites often include critical information which is not preserved on surficial, deflated sites. If intensive inventories show a strong possibility of buried, unrecorded sites, lessees may be required to monitor topsoil removal in critical areas. Historic properties found during topsoil removal would be subject to data recovery.

Finally, the determination that present levels of information are adequate for the purpose of 106 consultation and application of Unsuitability Criterion #7 is based on the premise that lease stipulations will unambiguously provide for in-place preservation of cultural resources, if adequate mitigating measures can not be devised.

Requirements for consultation with the Advisory Council have been fullfilled under provisions of the Programatic Memorandum of Agreement, Interagency Agreement No. NMSO-168 among the BLM, New Mexico State Historic Preservation Officer, and Advisory Council on Historic Preservation.

APPENDIX B
WATER RESOURCES

APPENDIX B
WATER RESOURCES

APPENDIX B-1

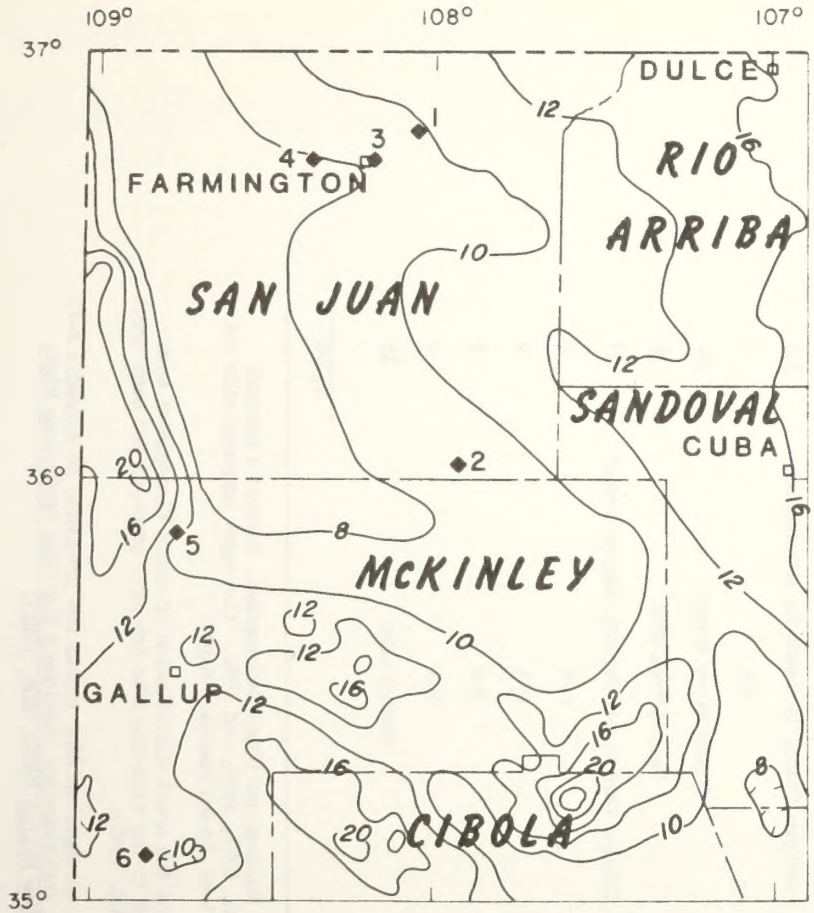
APPROXIMATE FLOODPLAIN ACREAGES
ON SURFACE MINEABLE COAL TRACTS[a/,b/]

Coal Tract	Major Drainageway(s) (including tributaries)	Acreage
La Plata #1	N/A	0
La Plata #3	N/A	0
Johnson Trading Post	San Isidro Wash	190
Star Lake East #1	Salazar and Papers Washes,	75
Star Lake West #2	Arroyo Pueblo Alto	16
Kimbeto #2	Betonnie Tsosie Wash	180
Gallo Wash #1	N/A	0
Bisti #1	Alamo and De-na-zin Washes, and Coal Creek	460
Bisti #2	Hunter Wash	87
Bisti #4	N/A	0
Bisti #6 and #8	N/A	0
Lee Ranch East	N/A	0
Lee Ranch Middle	San Isidro, Doctor, and Tinaja Arroyos, Mulatto Canyon Creek, and Voght Draw	948
Lee Ranch West	Canyon Largo and Mulatto Canyon Creeks, and Arroyos Leon and Tinaja	412
Divide	Canada Marcelina and Milpitas Draw	513
Crownpoint Northeast	Indian Creek and Kim-me-ni-oli Wash	400
Crownpoint East (LC & HC)	Kim-me-ni-oli Wash	405
Hospah #1	Inditos Draw and Kim-me-ni-oli Wash	509
Chico Wash South	Arroyos Chico, La Azabache and Seccion	315
Catalpa Canyon	N/A	0
Pinehaven	White Water Arroyo	380
Twin Buttes	Twin Buttes Wash	36
Hogback	Catalpa Canyon and Peretti Canyon Creeks	37
Sundance	N/A	0
Bread Springs #1	N/A	0
Gamerco #1 (LC)	N/A	0
Gamerco #1 (HC)	N/A	0
Samson Lake #2 (LC & HC)	Samson Lake	15
TOTAL		4,978

Source: U.S. Dept. of Housing and Urban Development, Federal Insurance Administration, 1977, 1978, and 1980. (Acreages computed with dot grid, using Flood Hazard Boundary Maps).

Notes: a/ Maps showing the areal distribution of these floodplains were presented in the Site-Specific Analysis prepared for each tract (USDI, BLM, 1982).

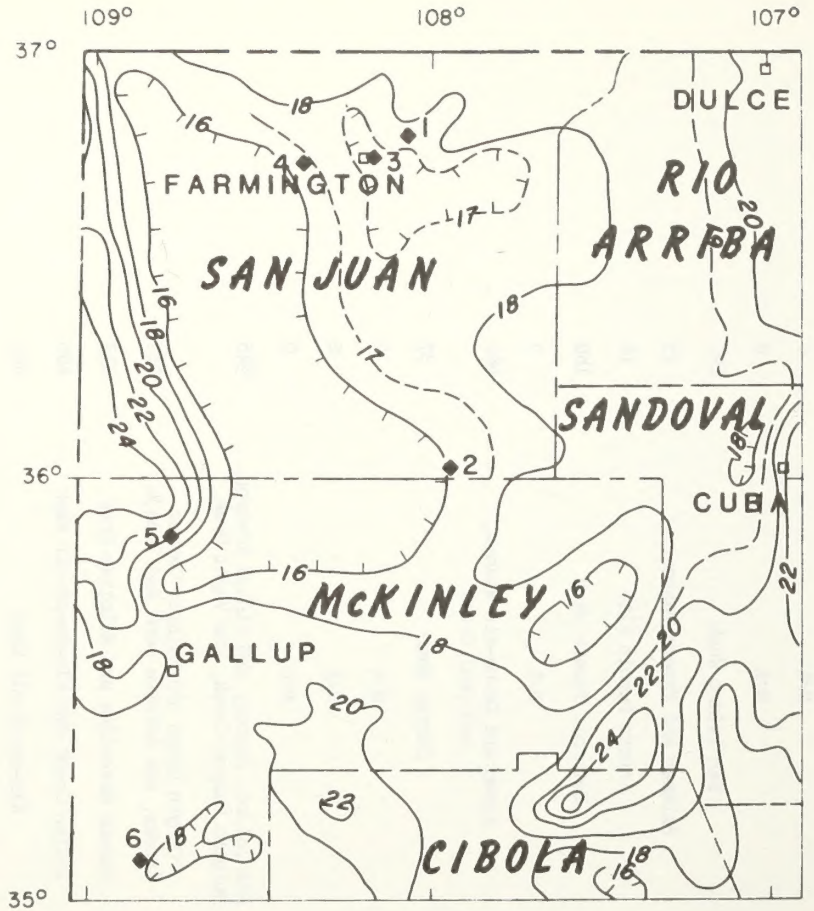
b/ Floodplain acreages on PRLA tracts are presented in Appendix F-12 of Final Environmental Assessment For Coal Preference Right Leasing New Mexico (USDI, BLM, 1981).



— 12 — LINE OF EQUAL AVERAGE ANNUAL PRECIPITATION, IN INCHES (1931-60)

Source: USDA, SCS 1974

0 6 12 18 MILES



— 18 — LINE OF EQUAL 10-YEAR 24-HOUR PRECIPITATION, IN TENTHS OF AN INCH

Source: USDA, SCS 1967

Number on figure	Station	Average precipitation, in inches (1941-70) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1	AZTEC RUINS NAT MON	0.75	0.64	0.71	0.70	0.60	0.48	0.87	1.29	0.90	1.17	0.54	0.89	9.54
2	CHACO CANYON NAT MON	0.43	0.45	0.62	0.51	0.60	0.44	1.09	1.39	1.07	1.01	0.46	0.69	8.76
3	FARMINGTON 4 NE	0.54	0.46	0.52	0.60	0.47	0.46	0.78	1.18	0.85	1.08	0.47	0.66	8.07
4	FRUITLAND 2 E	0.53	0.41	0.50	0.59	0.46	0.36	0.75	1.03	0.85	1.03	0.47	0.66	7.64
5	TOHATCHI 1 ESE	0.59	0.50	0.66	0.55	0.53	0.41	1.59	2.00	1.18	1.10	0.49	0.81	10.41
6	ZUNI FAA AIRPORT	0.85	0.66	0.90	0.58	0.36	0.40	1.78	2.09	1.16	1.15	0.59	0.81	11.33

Figure B-1. Average annual and 10-year 24-hour precipitation.

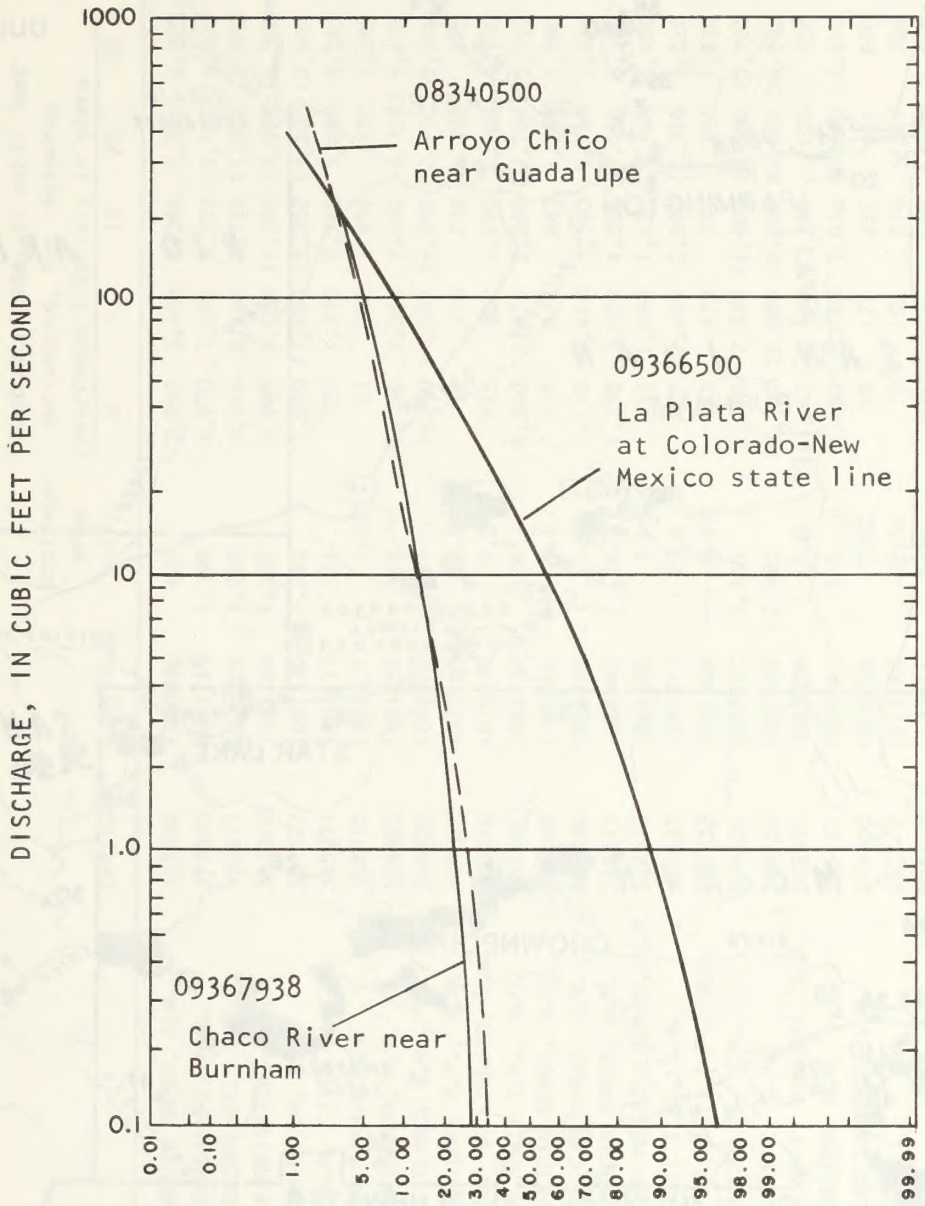


Figure B-2. Flow-duration curves for selected gaging stations.

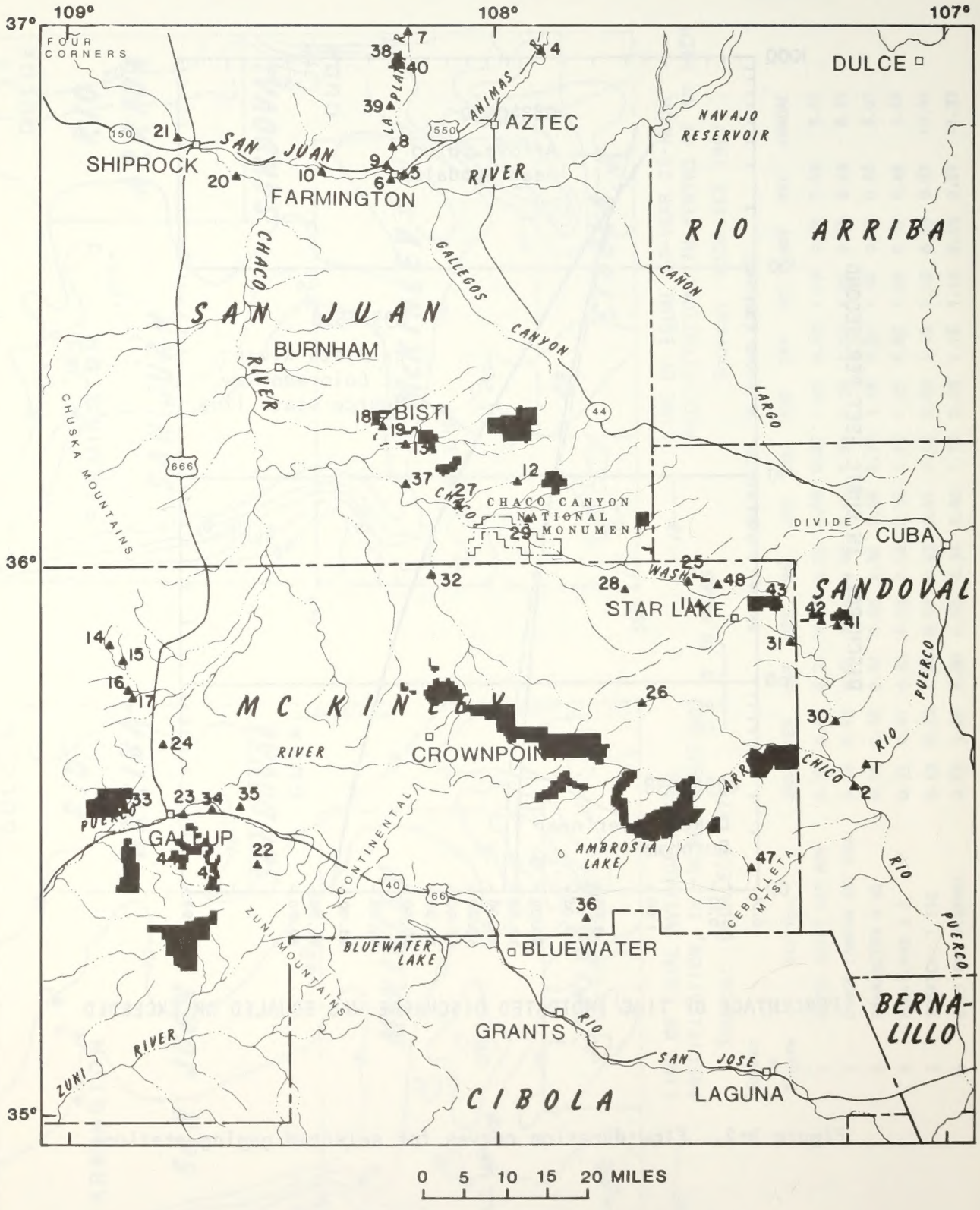


Figure B-3. Location of selected surface-water sites.

Table B-4 Streamflow characteristics for selected surface-water sites

Number on figure B-3	Station number	Site name	Latitude	Longitude	Drainage area (mi^2)	Flood magnitude, in cubic feet per second, for indicated recurrence interval, in years					Average annual discharge (ft^3/sec)
						2	5	10	25	50	
1	08334000	RIO PUERCO ABV ARROYO CHICO, N.M.	353808	1070956	420	2,290	3,460	4,260	5,290	6,070	13.4
2	08340500	ARROYO CHICO NR GUADALUPE, N.M.	353533	1071119	1,390	4,970	7,680	9,580	12,100	14,000	21.3
4	09363500	ANIMAS RIVER NR CEDAR HILL, N.M.	370217	1075225	1,090	5,710	8,100	9,730	11,800	13,500	898
5	09364500	ANIMAS RIVER AT FARMINGTON, N.M.	364312	1081208	1,360	5,980	9,030	11,200	14,000	16,300	919
6	09365000	SAN JUAN R AT FARMINGTON, N.M.	364322	1081330	7,240	7,930	11,100	13,200	15,800	17,600	2,373
7	09366500	LA PLATA R AT CO-N.M. STATE LINE	365951	1081117	331	750	1,570	2,310	3,480	4,540	34.9
8	09367400	LA PLATA R TRIB NR FARMINGTON	364710	1081331	1.03	57	222	451	952	1,540	0.03
9	09367500	LA PLATA R NR FARMINGTON, N.M.	364423	1081451	583	1,330	2,240	2,900	3,780	4,470	26.9
10	09367540	SAN JUAN R NR FRUITLAND, N.M.	364425	1082409	8,010	9,740	17,000	24,700	32,000	38,000	2,540
11	09367660	CHACO WASH NR STAR LAKE T.P., N.M.	355607	1073139	59.0	56	110	160	220	275	0.93
12	09367685	AH-SHI-SLE-PAH WASH NR KIMBETO, N.M.	360918	1075647	8.2	463	802	1,070	1,460	1,790	-
13	09367710	DE-NA-ZIN WASH NR BISTI T.P., N.M.	361351	1081157	184	1,390	1,930	2,280	2,700	3,000	-
14	09367840	YAZZIE WASH NR MEXICAN SPRGS, N.M.	355040	1085300	2.1	315	614	867	1,250	1,580	0.29
15	09367860	CHUSCA WASH NR MEXICAN SPRGS, N.M.	354840	1085050	8.7	1,110	2,410	3,590	5,490	7,230	0.38
16	09367880	CATRON WASH NR MEXICAN SPRGS, N.M.	354615	1084940	26.9	1,730	3,000	4,000	5,410	6,590	1.19
17	09367900	BLACK SPRGS WASH NR MEXICAN SPRGS, N.M.	354540	1084900	7.05	453	1,050	1,620	2,590	3,490	0.26
18	09367930	HUNTER WASH AT BISTI T.P., N.M.	361637	1081512	45.6	797	1,480	2,010	2,740	3,320	-
19	09367932	HUNTER WASH TRIB NR BISTI T.P., N.M.	361533	1081506	8.47	183	475	771	1,290	1,820	-
20	09367950	CHACO RIVER NR WATERFLOW, N.M.	364328	1083527	4,350	2,830	7,070	11,400	18,800	25,900	65.2
21	09368000	SAN JUAN R AT SHIPROCK, N.M.	364732	1084354	12,900	15,100	25,800	34,200	46,300	56,300	2,193
22	09395400	MILK RANCH CANYON NR FT WINGATE, N.M.	352555	1083330	14.0	63	188	336	626	938	1.10
23	09395500	PUERCO RIVER AT GALLUP, N.M.	353145	1084441	558	3,150	5,640	7,630	10,500	12,900	16.0
24	09395600	WAGON TRIAL WASH NR GAMERCO, N.M.	353900	1084700	0.42	70	177	287	481	670	-
25		ARROYO PUEBLO ALTO	355812	1073142	2.54	75	192	310	517	720	0.05
26		SANDOVAL ARROYO	354442	1073811	26.5	243	557	847	1,330	1,790	0.22
27		AH-SHI-SLE-PAH WASH	360614	1080514	43.1	399	945	1,460	2,330	3,180	0.67
28		PUEBLO PINTADO CANYON	355817	1073949	7.1	134	332	526	859	1,190	0.14
29		ESCAVADA WASH	360558	1075523	89.3	534	1,200	1,800	2,790	3,750	1.62
30		ARROYO PIEDRA LUMBRA	354147	1071309	78.0	499	1,130	1,700	2,650	3,560	2.19

Table B-4 Streamflow characteristics for selected surface-water sites - Concluded

Number on figure B-3	Station number	Site name	Latitude	Longitude	Drainage area (mi^2)	Flood magnitude, in cubic feet per second, for indicated recurrence interval, in years					Average annual discharge (ft^3/sec)
						2	5	10	25	50	
31		PAPERS WASH	355129	1071832	69.1	420	932	1,390	2,140	2,870	0.19
32		KIM-ME-NI-OLI WASH TRIB	355814	1080818	34.3	337	798	1,230	1,960	2,680	0.25
33		BURNED DEATH WASH	353144	1085147	53.3	383	869	1,310	2,040	2,750	1.90
34		PUERCO RIVER	353208	1084000	278	845	1,750	2,520	3,740	4,890	8.90
35		S. FK. PUERCO R TRIB	353143	1083614	11.2	157	375	584	935	1,280	0.57
36		ARROYO DEL PUERTO	352015	1074742	93.8	456	979	1,440	2,180	2,880	1.12
37		ROCK WASH	360913	1081247	4.6	12	37	65	116	169	0.10
38		MURPHY ARROYO TRIB	365650	1081402	0.2	14	41	70	126	184	0.01
39		PUMP CANYON	365102	1081403	0.4	12	37	65	116	169	0.02
40		MURPHY ARROYO	365619	1081258	5.8	34	94	157	270	384	0.38
41		SAN ISIDRO WASH	355327	1071242	64.1	856	1,890	2,800	4,200	5,440	1.89
42		SAN ISIDRO WASH TRIB	355405	1071442	0.6	14	41	70	126	184	0.02
43		PAPERS WASH TRIB	355535	1072108	3.7	14	41	70	126	184	0.13
44		BREAD SPRINGS WASH TRIB	352625	1084409	1.3	40	109	181	309	483	0.11
45		BREAD SPRINGS WASH	352403	1083953	6.9	193	473	743	1,180	1,600	0.76
46		DEFIANCE DRAW	353052	1085216	119	498	1,140	1,730	2,650	3,480	3.67
47		SALAZAR WASH (HEADWATERS)	352437	1072446	1.9	25	71	120	208	299	0.02
48		UNNAMED TRIB OF GAS TANK WASH	355743	1072812	.01	4	13	24	45	68	0.0

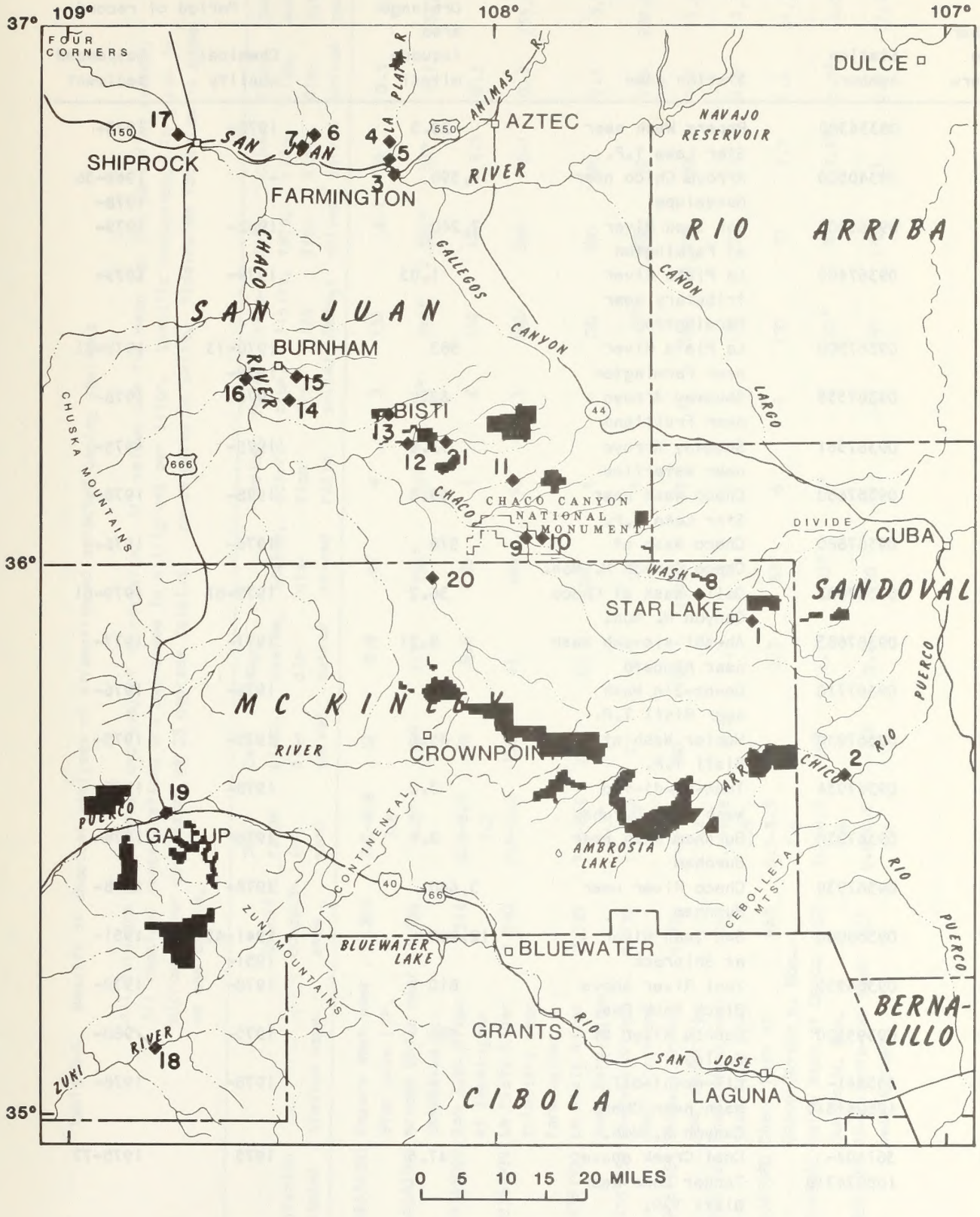


Figure B-5. Location of selected water-quality gaging stations.

Number on figure	Station number	Station name	Drainage area (square miles)	Period of record	
				Chemical quality	Suspended sediment
1	08334300	Papers Wash near Star Lake T.P.	20.3	1978-	1978-
2	08340500	Arroyo Chico near Guadalupe	1,390	-	1948-56 1978-
3	09365000	San Juan River at Farmington	7,240	1962-	1979-
4	09367400	La Plata River tributary near Farmington	1.03	1979-	1979-
5	09367500	La Plata River near Farmington	583	1970-73 1978-	1978-81
6	09367555	Shumway Arroyo near Fruitland	62.8	1976-	1976-
7	09367561	Shumway Arroyo near Waterflow	73.8	1975-	1975-
8	09367660	Chaco Wash near Star Lake T.P.	59.0	1978-	1978-
9	09367680	Chaco Wash at Chaco Canyon N. Mon.	578	1976-	1976-
10	09367682	Gallo Wash at Chaco Canyon N. Mon.	36.2	1979-81	1979-81
11	09367685	Ah-shi-sle-pah Wash near Kimbeto	8.21	1977-	1977-
12	09367710	De-na-zin Wash near Bisti T.P.	184	1976-	1976-
13	09367930	Hunter Wash at Bisti T.P.	45.6	1975-	1975-
14	09367934	Teec-ni-di-tso Wash near Burnham	7.2	1978-	1978-
15	09367936	Burnham Wash near Burnham	8.6	1978-	1978-
16	09367938	Chaco River near Burnham	3,640	1978-	1978-
17	09368000	San Juan River at Shiprock	12,900	1941-45 1951-	1951-
18	09386950	Zuni River above Black Rock Res.	810	1978-	1979-
19	09395500	Puerco River at Gallup	558	1975-	1980-
20	355841-108081810	Kim-me-ni-oli Wash near Chaco Canyon N. Mon.	-	1978-	1978-
21	361404-108074710	Coal Creek above Tanner Lake near Bisti T.P.	47.5	1975	1975-77

Source: Modified from Hejl (1982)

Table B-6. Results of chemical analyses of streamflow at selected gaging stations

All data are provisional and subject to revision. All values are the mean for the period of record. All chemical concentrations are expressed in milligrams per liter. Specific conductance is given in micromhos per centimeter at 25 degrees Celsius. pH is given in units. *indicates the value is based on one sample.

Number on figure B-5	Station number	Station name	Specific conductance	pH, range and mean	Calcium, dissolved	Magnesium, dissolved	Sodium, dissolved	Sodium adsorption ratio	Potassium, dissolved	Alkalinity, (as $CaCO_3$)	Sulfate, dissolved	Chloride, dissolved	Fluoride, dissolved	Sediment, suspended
1	08334300	Papers Wash near Star Lake T.P.	309	7.0-8.9 7.8	10	0.9	47	4	3	130	6.2	10	0.5	5,950
2	08340500	Arroyo Chico near Guadalupe	1,200	8.8*	50*	11*	750*	25*	4*	340*	1,300*	54*	1.1*	32,000
3	09365000	San Juan River at Farmington	514	6.9-8.9 7.2	56	8.6	40	1	2	110	140	9.5	0.3	789
4	09367400	La Plata River tributary near Farmington	1,040	6.6-8.2	100	11	160	10	3	140	540	6.1	0.7	135,000
5	09367500	La Plata River near Farmington	2,320	7.7-8.6 8.3	200	82	260	4	4	220	990	94	0.5	3,690
6	09367555	Shumway Arroyo near Fruitland	1,430	7.0-7.6 7.2	37	7.3	94	4	8	62*	220	10	0.8	224,000
7	09367561	Shumway Arroyo near Waterflow	6,790	2.4-10.4 7.4	340	190	1,400	17	15	160	3,900	350	5.9	13,600
8	09367660	Chaco Wash near Star Lake T.P.	589	6.8-8.8 7.5	9.3	0.7	71	7	3	130	73	11	0.5	17,700
9	09367680	Chaco Wash at Chaco Canyon N. Mon.	465	6.3-8.5 7.6	21	2.2	83	6	4	170	71	7.7	0.8	29,700
10	09367682	Gallo Wash at Chaco Canyon N. Mon.	432	7.1-8.3 7.8	16*	1.7*	43*	3*	7*	80*	56*	7.8*	0.2*	2,570
11	09367685	Ah-shi-sle-pah Wash near Kimbeto	823	6.6-8.6 7.6	7.6	0.8	130	13	4	190	170	23	0.5	51,200

Table B-6. Results of chemical analyses of streamflow at selected gaging stations - Concluded

Number on figure B-5	Station number	Station name	Specific conductance	pH, range and mean	Calcium, dissolved	Magnesium, dissolved	Sodium, dissolved	Sodium adsorption ratio	Potassium, dissolved	Alkalinity, (as $CaCo_3$)	Sulfate, dissolved	Chloride, dissolved	Fluoride, dissolved	Sediment, suspended
12	09367710	De-na-zin Wash near Bisti T.P.	718	6.5-8.5 7.8	8.6	0.6	140	14	3	180	130	7.0	1.2	53,400
13	09367930	Hunter Wash at Bisti T.P.	1,060	6.8-9.8 7.7	23	2.4	190	12	6	170	290	12	0.1	51,900
14	09367934	Teec-ni-di-tso Wash near Burnham	489	8.0-9.3 8.6	4.4	0.6	93	11	2	160	96	8.1	0.8	19,900
15	09367936	Burnham Wash near Burnham	770	7.3-9.3 8.1	11	3.3	150	11	4	240	160	8.8	0.8	102,000
16	09367938	Chaco River near Burnham	1,170	6.7-8.9 8.1	16	1.6	130	10	3	250	150	8.6	0.8	58,100
17	09368000	San Juan River at Shiprock	672	7.0-9.0 8.1	68	14	56	2	3	120	210	14	0.4	9,490
18	09386950	Zuni River above Black Rock Res.	650	7.7-8.4 8.1	52	19	62	2	4	180	100	17	0.3	355
19	09395500	Puerco River at Gallup	1,080	3.4-8.9 8.0	40	18	160	6	5	230	330	28	0.7	24,400
20	355841-108081810	Kim-me-ni-oli Wash near Chaco Canyon N. Mon.	1,720	7.4-9.0 8.2	16	2.1	510	33	5	310	720	82	1.7	4,540
21	361404-108074710	Coal Creek above Tanner Lake near Bisti T.P.	1,640	6.9-8.1 7.2	17	1.4	120	8	4	160	120	6.5	1.0	38,300

Table B-7. Results of trace-element analyses of streamflow at selected gaging stations

All data are provisional and subject to revision. All values are the mean for the period of record. All concentrations are expressed in micrograms per liter. * indicates the value is based on one sample. * * indicates the concentration is reported to the nearest 1/2 microgram.

Number on figure B-5	Station number	Station name	Boron, dissolved	Iron, dissolved	Manganese, dissolved	Chromium, dissolved	Aluminum, dissolved	Mercury, dissolved * *	Selenium, dissolved	Strontium, dissolved	Zinc, dissolved
3	09365000	San Juan River at Farmington	50	40	21	4	100*	0	1	920*	20
5	09367500	La Plata River near Farmington	110	40	250	5	40	0	2	2,100	20
7	09367561	Shumway Arroyo near Waterflow	2,100	690	480	10	-	0.5	150	2,600	80
9	09367680	Chaco Wash at Chaco Canyon N.Mon.	80	540	220	-	100	0	1	190	20
11	09367685	Ah-Shi-Sle-Pah Wash near Kimbeto	150	720	22	10	30*	0.5	2	150	60
12	09367710	De-Na-Zin Wash near Bisti T.P.	240	380	8	6	-	0	3	200	40
13	09367930	Hunter Wash at Bisti T.P.	210	1,200	80	10	-	0	6	650	30
16	09367938	Chaco River near Burham	200	430	12	7	200	1.0	3	270	20
17	09368000	San Juan River at Shiprock	130	20	71	5	30	0.5	2	620	40
19	09395500	Puerco River at Gallup	150	13,000	5*	8	-	0	38	-	9

APPENDIX B-8

Table B-8. Estimates of sediment yield from PRLA tracts.

PRLA number	Total surface area disturbed in acres	Erosion rate, in acre-feet per square mile per year	Sediment yield, in acre-feet per year
NM-585	2,811	1-3	4.4-13.2
NM-3752	3,760	1-3(50%) .2-.5 (50%)	3.6-10.3
NM-3753	2,951	1-3 (55%) .2-.5 (45%)	2.9-8.6
NM-3754	3,075	.2-.5 (80%) 1-3 (20%)	1.7-4.8
NM-3755	2,588	1-3 (10%) >3 (90%)	11.2-12.2
NM-3834	160	>3	>.75
NM-3835	4,500	1-3 (25%) .2-.5 (75%)	2.8-7.9
NM-3836	5,110	1-3	8-24
NM-3837	5,120	1-3 (70%) >3 (30%)	12.8-24.0
NM-3838	4,787	>3	>22.4
NM-3918	4,477	1-3 (42%) .2-.5 (42%) >3 (16%)	3.8-13.4
NM-3919	4,478	1-3	.7-21.
NM-6801	160	0-.2	0-.05
NM-6802	340	>3	>1.6
NM-6803	160	1-3	.25-.75
NM-6804	1,602	>3 (60%) 1-3 (40%)	5.5-7.5
NM-7235	160	.2-.5	.03-.12
NM-8128	4499	1-3 (90%) .2-.5 (10%)	6.3-19
NM-8129	1520	1-3 (45%) >3 (45%) .2-.5 (10%)	4.3-6.5
NM-8130	2133	1-3 (80%) .2-.5 (20%)	2.8-8.3
NM-8715	1921	.2-.5 (50%) 1-3 (50%)	1.8-5.2
NM-8717	600	1-3	.9-2.8
NM-8745	520	1-3	.8-2.4
NM-9764	240	1-3	.4-1.1
NM-11670	1119	.2-.5 (90%) >3 (10%)	2.1-5.2
NM-11916	160	>3	>.75

Surface acres disturbed are based on preliminary estimates and will be changed to reflect revised estimates.
Erosion rates from Figure 2-5 in the Draft Environmental Assessment for Coal Preference Right Leasing, New Mexico (USDI, BLM 1981a).

APPENDIX B-9

Table B-9. Estimates of sediment yield from coal tracts

Lease area	Total surface area disturbed in acres	Erosion rate, in acre-feet per square mile per year	Sediment yield, in acre-feet per year
La Plata 1	1070	.5-1	.8-1.7
La Plata 3	1128	.5-1	.9-1.8
Johnson Trading Post	5112	.2-.5	1.6-4.0
Star Lake East 1	4130	1-3	6.5-19.4
Star Lake West 2	2165	.2-.5	.7-1.7
Kimbeto 2	1135	.2-.5	.4-.9
Gallo Wash 1	1906	1-3	3.0-8.9
Bisti 1	4871	1-3	7.6-22.8
Bisti 2	4598	1-3	7.2-21.6
Bisti 4	3740	1-3	5.8-17.5
Bisti 6/8	560	1-3	.9-2.6
Lee Ranch East	2196	1-3	3.4-10.3
Lee Ranch Middle	8572	1-3	13.4-40.2
Lee Ranch West	10132	1-3	15.8-47.5
Divide	4325	1-3	6.8-20.3
Crownpoint NE	10834	.5-1	8.5-16.9
Crownpoint East	12979	.5-1	10.1-20.3
Hospah 1	-	1-3	-
Chico Wash South	8572	<.2	<2.7
Catalpa Canyon	730	.5-1	.6-1.1
Sandance	1597	.5-1	1.2-2.5
Hogback	2198	.5-1	1.7-3.4
Twin Buttes	12550	.5-1	9.8-19.6
Pinehaven	1831	.5-1	1.4-2.9
Bread Springs 1	930	.5-1	.7-1.5
Gamerco 1 and 2	1942	.5-1	1.5-3.0
Samson Lake 2/2	973	.5-1	.8-1.5
La Plata 2 *	160	.5-1	.1-.2
La Plata 4 *	160	.5-1	.1-.2
Star Lake East 2	160	1-3	.2-.7
Kimbeto *	160	1-3	.2-.7
Nageezi *	160	1-3	.2-.7
Gallo Wash *	-	1-3	-
Hospah	-	1-3	-
Tah-ha-bah well *	160	.5-1	.1-.2
Bread Springs 2	80	.5-1	.06-.1
Gamerco *	160	.5-1	.1-.2
Samson Lake 1 *	160	.5-1	.1-.2

* Indicates underground mine.

Surface acres disturbed are based on preliminary estimates and will be changed to reflect revised estimates

Erosion rates from Figure 2-5 in the Draft Environmental Assessment for Coal Preference Right Leasing, New Mexico (USDI, BLM 1981a)

Table B-10. Results of chemical analyses of runoff samples from mine-reclamation plots

All data are provisional and subject to revision. All chemical concentrations are expressed in milligrams per liter. Specific conductance is given in micromhos per centimeter at 25 degrees Celsius.

Location	Date of sample	Calcium, dissolved	Sodium, dissolved	Magnesium, dissolved	Potassium, dissolved	Sulfate, dissolved	Chloride, dissolved	Fluoride, dissolved	Alkalinity (as $CaCO_3$)	Sodium adsorption ratio	pH (units)	Specific conductance
San Juan Mine												
1974	07-12-82	40	29	7.1	18	7.0	13	0.3	220	1	6.9	460
reclamation	04-23-82	110	1,200	25	13	2,300	54	1.1	120	27	8.0	4,800
plot	10-02-81	39	47	6.7	22	8.0	15	0.3	200	2	7.1	500
	02-13-79	31	9.8	2.9	17	13	9.8	.1	100	0.5	-	-
1977	04-23-82	310	800	41	14	2,300	22	.5	90	11	7.0	4,580
reclamation	(upper stage)											
plot	04-23-82	36	86	3.9	9	160	4.9	.8	120	4	7.4	610
	(lower stage)											
	10-02-81	67	53	7.9	15	33	4.2	.5	270	2	6.9	625
	07-12-81	99	80	12	15	310	4.1	.4	210	2	6.7	965
	11-03-78	41	94	4.4	14	130	5.9	.5	210	4	7.0	640
	09-24-78	53	100	7.8	22	200	7.9	.5	210	3	7.4	940
Navajo Mine												
1973	04-23-82	31	10	4.5	9	17	2.5	.8	72	0.5	7.5	275
reclamation	03-05-80	19	11	2.4	8	57	2.1	.2	3	.6	6.8	188
plot	02-13-79	38	23	6.9	-	-	-	-	38	.9	6.8	410
1976	02-13-79	13	100	0.9	4	-	-	-	43	7	6.8	590
reclamation	(upper stage)											
plot	02-13-79	18	210	1.6	6	43	39	.6	120	13	7.1	1,120
	(lower stage)											
1978	02-13-79	150	130	27	12	610	26	.8	74	3	6.0	1,330
reclamation	09-24-78	280	440	74	13	1,600	130	1.9	130	6	7.2	3,400
plot	09-24-78	300	500	92	15	1,900	210	2.4	100	7	7.3	3,600

APPENDIX B-11

DIGITAL MODELING OF GROUND-WATER IMPACTS

Ground-water impacts were analyzed by the Geological Survey (GS), Water Resource Division (WRD) under a formal agreement. Results should be considered as engineering estimates of the effects of ground-water withdrawals on water levels in the major artesian aquifers underlying the coal tracts.

Description of the Model

These impacts were analyzed with the aid of a digital computer. The three dimensional, steady-state model of Frenzel and Lyford (1982) was converted to the transient state, by adding pumping stresses. Grid blocks were six miles on a side. The vertical direction consisted of seven layers ranging in thickness from 300 to 1,500 feet. These layers generally coincided with Jurassic through Cretaceous strata (major aquifers and confining beds) of the San Juan structural basin. The relationship of model layers to geologic units is shown diagrammatically on Figure B-11-1. These relationships are summarized below (in ascending order).

Layer 1 - Entrada Sandstone (Jurassic). This is a major potential aquifer (300 feet thick).

Layer 2 - Todilto Limestone, Summerville Formation, Bluff Sandstone, Cow Springs Sandstone, Salt Wash and Recapture Members of Morrison Formation (all Jurassic). This is a confining bed group (500 feet thick).

Layer 3 - Westwater Canyon Member of Morrison Formation (Jurassic). This is a major aquifer in the San Juan structural basin (300 feet thick).

Layer 4 - Brushy Basin Member of Morrison Formation (Jurrassic), Dakota Sandstone, lower part of Mancos Shale (both upper Cretaceous). This is a confining bed group (500 feet thick).

Layer 5 - Gallup Sandstone. A major aquifer in the southwest half of the structural bsin; and the middle part of the Mancos Shale, a confining bed in the northeast half of the basin (both upper Cretaceous). Layer 5 is 700 feet thick.

Layer 6 - Middle Mesaverde Group sandstone aquifers to the South (Crevasse Canyon Formation and Dalton Sandstone Member); and the upper Mancos Shale confining bed to the North (all upper Cretaceous). Layer 6 is 1,000 feet thick.

Layer 7 - Upper Mesaverde Group sandstone aquifers (Point Lookout Sandstone, Menefee Formation, Cliff House Sandstone); and the lower part of the Lewis Shale confining bed (all upper Cretaceous). Layer 7 is 1,500 feet thick.

For greater details regarding the digital model used to analyze ground-water impacts, interested readers are referred to Frenzel and Lyford (1982).

Input to Model

Model input-data consisted of ground-water withdrawal rates in cubic feet per second (CFS), time period of the withdrawals, and aquifer layer. Withdrawals necessarily included those from existing and planned uranium and coal mines, municipalities, major water wells (all those projects identified on BLM's Futures 1 and 2 Baselines), and projected ground-water withdrawals from PRLA and competitive coal lease companies.

Historical pumpage was assumed to have begun in 1941 and continue through 1980; up to 1941 the steady-state conditions of Frenzel and Lyford (1982) were assumed to exist. Much of the historical pumpage data were those used by Woodward Clyde Consultants (1982). Withdrawals from PRLA's were those listed on applications to appropriate ground-water in the San Juan basin (or file at New Mexico State Engineer Office). Competitive coal lease withdrawals were those given in tract analysis engineering reports (Minerals Management Service, 1982). For simplicities sake, competitive coal withdrawals were assumed to be located in the center of each tract. These ground-water withdrawals, pumping periods, locations, and aquifer layers specified for each project simulated are on file at the BLM Rio Puerco Resource Area, in Albuquerque.

The period modeled began in 1941 and ended in 2040. This period was divided into 5-year increments, except for the 1980's, which were divided into a 7-year increment (1981-1987), and a 3-year increment (1988-1990).

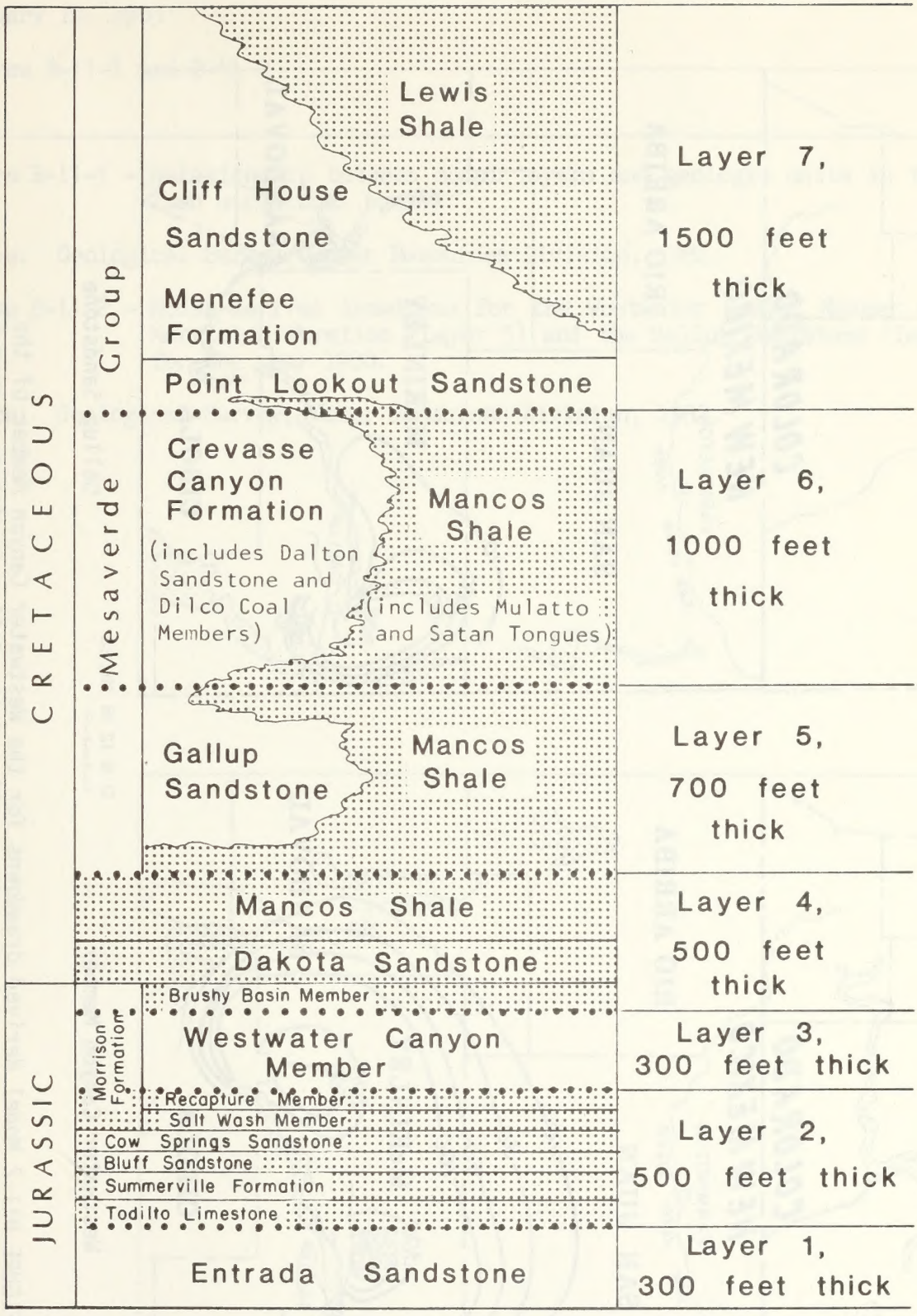
Results of Modeling

Results of the ground-water impacts modeling are expressed in terms of drawdown and changes in the mass balance. As a reference base, historical drawdowns (those derived by the model for 1980, after 40 years of pumping) for the Westwater canyon Member of the Morrison Formation and the Gallup Sandstone are shown on Figure B-11-2. For the other aquifer layers, 1980 drawdowns were less than 10 feet.

Impact analysis consisted of modeling historical pumpage impacts from BLM's Futures 1 and 2 Baselines. Each alternative was, in turn, added in sequence to this baseline to derive impacts resulting from increasing levels of development.

Changes in Mass Balance

In a steady condition no ground-water comes from or goes into storage. A steady-state condition was assumed to exist before 1941. Between 1941 and 1980 most ground-water withdrawn came from storage with minor increases in ground-water inflow and decreases in outflow. This pattern continued through the model simulation of future ground-water withdrawals.



NOTE: Shaded areas are defined as confining beds in the model.

FIGURE B11-1 Relationship between model layers and geologic units in the San Juan structural basin.

Source: GS, WRD. 1983.

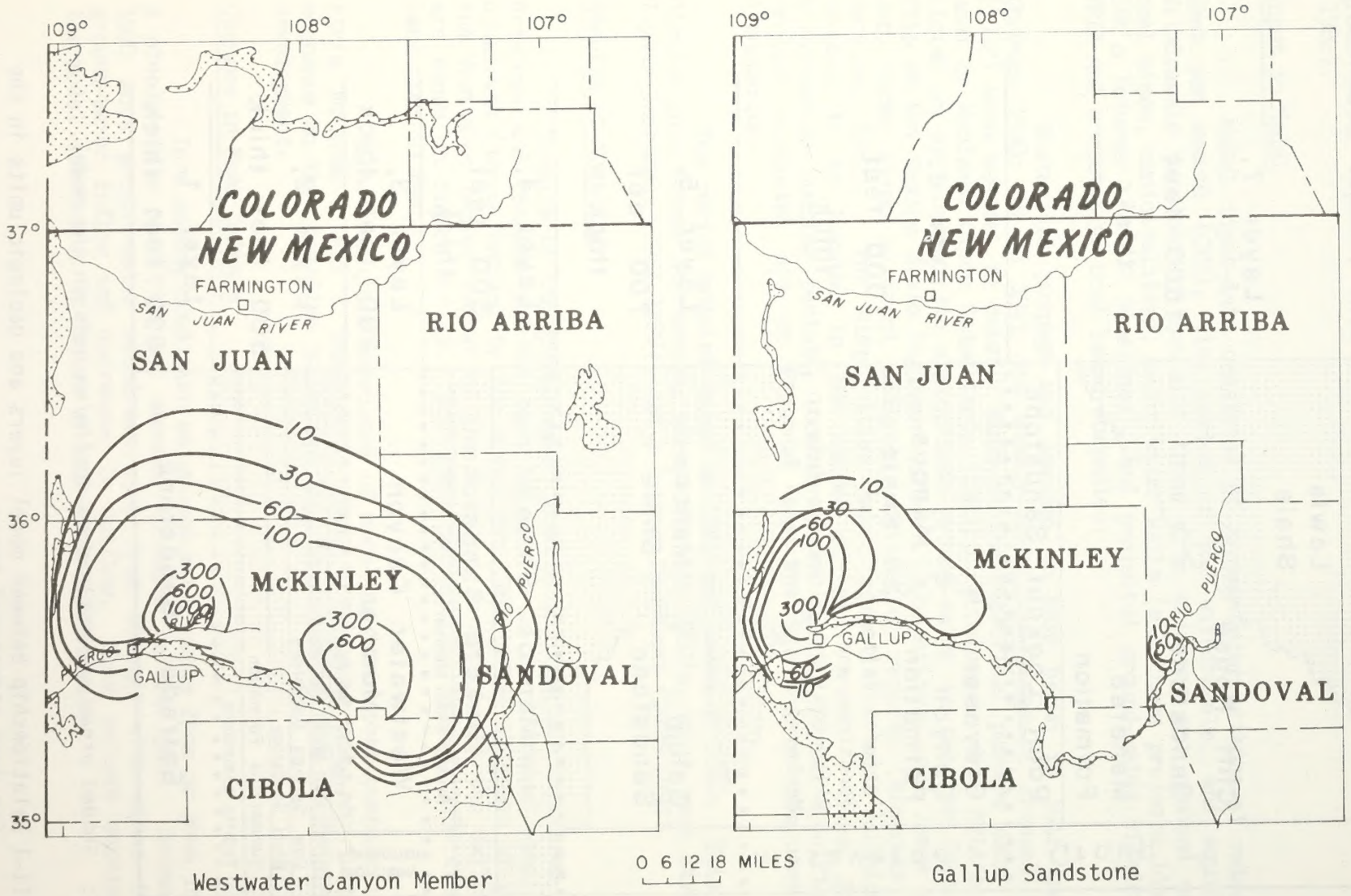


FIGURE B11-2 Model derived drawdowns for the Westwater Canyon Member of the Morrison Formation (Layer 3) and the Gallup Sandstone (Layer 5) for the year 1980.

Source: GS, WRD. 1983.

February 10, 1983

Figures B-11-1 and B-11-2

Figure B-11-1 - Relationship between model layers and geologic units in the San Juan structural basin.

Source: Geological Survey, Water Resources Division, 1982.

Figure B-11-2 - Model-derived drawdowns for the Westwater Canyon Member of the Morrision Formtion (Layer 3) and the Gallup Sandstone (Layer 5) for the year 1980.

Source: Geological Survey, Water Resources Division, 1982.

APPENDIX C
VEGETATION

VEGETATION

APPENDIX C

APPENDIX C-1

VEGETATION TYPES

Sagebrush Type: (041)

Big sagebrush is the dominant species. Sagebrush and perennial understory species density varies with soil type and past grazing use. Native vegetation production potential is good.

Grass species commonly present with big sagebrush include blue grama, galleta, bottlebrush squirreltail, western wheatgrass, sand dropseed and Indian ricegrass. Common forbs are wildbuckwheat, Russian thistle, tansymustard and wooly Indian-wheat. Broom snakeweed, fourwing saltbrush, pricklypear cactus, and winterfat are typical shrubs.

Pinyon-Juniper Type

The type is dominated by an overstory of pinyon pine and juniper species. Browse and grass production is greater when the stand is young. As the stand matures, shading increases and limits understory production. Isolated pockets of ponderosa pine, Douglas fir, quaking aspen, and narrowleaf cottonwood are found at heads of many rocky canyons.

Principal shrub species include true mountain-mahogany, antelope bitterbrush, oakbrush species, Mormon-tea, fourwing saltbush, pricklypear cactus, serviceberry and New Mexican cliffrose. Sparse understory cover includes blue grama, galleta, Indian ricegrass, prairie junegrass, sand dropseed, muttongrass and needle-and-thread. Scattered forbs are wildbuckwheat, penstemon species, fleabane, milkvetch species, and Hymenoxys species.

Grassland Type

The grassland type is not uniform throughout, but is dominated by galleta and blue grama. Areas of deep, coarse textured soils commonly support Indian ricegrass, galleta, blue grama, sand dropseed, fourwing saltbush and Mormon-tea. Swales, drainages, and low lying areas where soils are mildly alkali contain galleta, alkali sacaton, bottlebrush squirreltail, and western wheatgrass. Black greasewood, shadscale and fourwing saltbush are major scattered shrubs. Sunflower species annual saltbush species, and Russian thistle are common forbs. Upland soils of greater loam and clay content support a grass complex where galleta, blue grama, alkali sacaton, sand dropseed, and red threeawn dominate. Characteristic shrubs include fourwing saltbush, winterfat, sagebrush species, soapweed, Mormon tea, broom snakeweed, and rabbitbrush species. Wooly Indian-wheat, Russian thistle, wildbuckwheat, globmallow, and dock are common forbs.

Production of native vegetation for livestock use is good. Numerous Navajo family operations, as well as a few larger livestock operators are supported by this type.

Halophytic Type

Black greasewood dominates the aspect on alkaline soils, while fourwing saltbush occupies saline soils. They may be found growing together associated with mound saltbush shadescale, mat saltbrush and big sagebrush. Major grass species are alkali sacaton and other dropseed species galleta, western wheatgrass, bottlebrush squirreltail, and inland saltgrass. Forbs are frequent including Russian thistle, goosefoot species, stickseed pepperweed, fireweed, summercypress, pussytoes, annual saltbush species, dock, and seepweed. Vegetation production potential is limited by soil restrictions.

Fourwing saltbush and black greasewood comprise overstory vegetation. Fourwing saltbush is prevalent on saline soils while black greasewood is most prevalent on alkaline soils.

Common grasses are alkali sacaton, galleta, western wheatgrass, blue grama and inland saltgrass. Frequent forbs are Russian thistle, goosefoot species, stickseed, pussytoes pepperweed, and fireweed summercypress.

Vegetation consists of grasses, scattered shrubs and an abundance of annuals. The site can support a good grass cover when in good range condition and under proper range management. Alkali sacaton, black greasewood, fourwing saltbush, galleta, inland saltgrass, shadscale, and broom snakeweed comprise a major portion of the vegetation.

Potential perennial production is good for native saline and sodic tolerant species, under proper management.

Conifer Type

Overstory consists of mixed pinyon, juniper species and ponderosa pine, with Douglas fir occurring on moist, shaded sites. Pinyon and ponderosa pine are found on more exposed rocky areas. Quaking aspen also occurs in canyon heads. Understory is dominated by grasses such as blue grama, galleta, bottlebrush squirreltail, Arizona fescuse, prairie junegrass, muttongrass, mountain muhly, and western wheatgrass. Shrubs/species are not abundant.

Rock Outcrop Type

General aspect is rocky with scattered pinyon pine, juniper species and shrub. Common shrubs include New Mexico cliffrose, antelope bitterbrush, serviceberry, true mountain mahogany, big sagebrush, bud sagebrush, pricklypear cactus, broom snakeweed, fendler bush, rabbitbrush species, and Mormon-tea. Grasses are not common.

Majority of vegetation is located along channel edges. These edges often have a high watertable and support sub-irrigated riparian vegetation. The arroyo or river bed is usually barren. Riparian areas support a diverse complex of vegetation, with common species being cottonwood, saltcedar, Russian-Olive, sedges, rushes, inland saltgrass, western wheatgrass, and numerous forbs.

Duneland Type

It is composed of deep, excessively drained, gently to moderately sloping, shifting, nearly barren sand masses.

Vegetation is sparse. Woody species dominate, with shrubs often covering sand dune tops. Species occurring include black greasewood, fourwing saltbush, giant dropseed, Indian ricegrass, and alkali sacaton. Forb occurrence is limited.

Badlands Type

Vegetation is generally located in flats and intermittent channels which dissect the landform. Vegetation is sparse. Main grasses are alkali sacaton and galleta. Shrubs are black greasewood, shadescale, mound saltbrush, fourwing saltbush, broom snakeweed, rabbitbrush species, and Mormon tea. Principal forbs are Russian thistle, wildbuckwheat, annual saltbush species, four-o'clock, and composite species.

Riverwash-Wetland Type

Streamflow is highly variable, intermittent, and of short duration. These drainages are dry the majority of the year.

APPENDIX D
WILDLIFE

APPENDIX D

BIOLOGICAL ASSESSMENT

for

SAN JUAN RIVER REGIONAL COAL EIS

Prepared by

J. David Renwald

Wildlife Management Biologist

United States Department of Interior
Bureau of Land Management
Farmington Resource Area
Farmington, New Mexico

Federal Threatened or Endangered Species
Potentially Occurring Within the San
Juan Regional Coal ES Area
and Determination of Effect

1. Peregrine Falcon (Falco peregrinus) - No effect.

2. Bald Eagle (Haliaeetus leucocephalus) - May effect.

3. Black-footed Ferret (Mustela nigripes) - May effect.

4. Colorado River Squawfish (Ptychocheilus lucius) - No effect.

5. Mesa-verde Cactus (Sclerocactus mesa-verdae) - May effect.

Proposed Species - None

Critical Habitat - None

Basis for Determination of Effect

1. Peregrine Falcon

In the Revised Check-list for the Birds of New Mexico by Hubbard (1978) it states that the peregrine falcon summers in montane areas statewide and breeds on cliffs near water. However, there are no known historical nesting records for the project area (Nelson, personal communication, 1982) though birds are seen during spring and fall migrations. Raptor nesting surveys (opportunistic) conducted for the BLM by Bio-West, Inc., an independent contractor, from July 1980 through September 1981 turned up no evidence of peregrine falcon nesting. Surveys were conducted from ground and helicopter routes in potentially suitable cliff areas. Raptor nest surveys conducted cooperatively by the USFWS and BLM using helicopters (April 6, 7, 1982 and June 2, 1982) also proved negative.

Consultation with the New Mexico Department of Game and Fish (NMDG&F) pertaining to Coal Unsuitability Criteria #10 was conducted during planning stages for the Chaco Unit Resource Analysis in 1980. At that time they stated that there were no habitats on federal lands critical or essential to T&E plants or animals (see attached Enclosure 1). Other sources used for determination of effect were: the U. S. Forest Service Run-Wild Program; New Mexico Heritage Program; A Wildlife Inventory of the Star Lake-Bisti Coal Lease Area by the Office of Biological Services, USFWS; and the most recent issues of American Birds from February, 1976 through March, 1982.

We feel that the general lack of water, adjacent cliff sites and preferred prey items preclude peregrine falcons from nesting or wintering in the project area.

2. Bald Eagle

The discussion concerning the peregrine falcon is applicable here. The same contracted and cooperative nesting surveys proved negative. Consultation with the state (see Enclosure 1) and numerous public meetings conducted by the Regional Coal Team in 1982 also resulted in no important habitat identified by NMDG&F. Winter bald eagle use along the La Plata River is not close enough to the La Plata 1-4 tracts to pose significant impacts (see Map D-1).

Sources and references are the same as for the peregrine falcon with the addition of Wintering Bald Eagle Studies compiled by Grubb (1979).

3. Black-footed Ferret

The potential for finding black-footed ferrets (BFF) does exist in northwest New Mexico (Findlay 1977, USFWS 1980). Recent surveys for BFF have proved negative within and adjacent to the EIS project area. These surveys include: the MAPCO, Inc. linear right-of-way completed in the summer of 1980; Investigations of Potential Black-footed Ferret Habitat in the Vicinity of Crownpoint, New Mexico done by Sverdrup & Parcel and Associates, Inc., occular reconnaissance of prairie dog towns within the study area inventoried by Bio-West, Inc. a contractor hired by BLM to do wildlife surveys in the Chaco-Bisti area; and numerous surveys done by USFWS prior to prairie dog poisoning programs in northwest New Mexico. A BFF sighting by Berger in 1977, at one time confirmed, is presently considered unconfirmed after recent conversations with Berger.

In order to provide for the welfare of potential BFF's mine plans within the project area will stipulate that any prairie dog towns larger than 50 acres that could be destroyed by mining activities will have a standard BFF survey. This is in keeping with your letter to the State Director, BLM, dated September 8, 1981.

Based on the above information we have determined no impact on BFF's.

4. Colorado River Squawfish

One of the assumptions of the PDEIS is that subsurface water in the vicinity of leased coal tracts would be used in mining operations, therefore we have determined that habitats of the Colorado River Squawfish in the San Juan and Animas Rivers would not be affected.

5. Mesa-verde Cactus

Potential habitat has been identified in the Chaco area for this species, however, no extensive ground surveys have been completed. Stipulations in mine plans would require surveys and mitigation to protect this species. No impact on this cactus is expected.

References

Peregrine Falcon:

Hubbard, J.P. 1978. Revised checklist of the Birds of New Mexico. NMSO Publication No. 6.

Nelson, A. 1982. Resident birder in northwest New Mexico for over 20 years. Regional compiler for American Birds.

New Mexico Dept. of Game and Fish. Letter dated May 9, 1980 concerning lands suitable for coal mining.

Arbib, R.A. Editor, American Birds. Issues from Vol. 30, No. 1 to Vol. 36, No. 2.

U. S. Fish & Wildlife Service, 1977. A Wildlife Inventory of the Star Lake-Bisti Coal Lease Area. 80 pp.

Bio-West, Inc., 1982. Wildlife Resource Inventory of the Chaco Strippable Coal Belt Area, New Mexico. Contract YA-553-CTO-1072 for USDI-BLM, Albuquerque, New Mexico. 241 pp.

Bald Eagle:

Same as above, plus:

Grubb, T. 1979. Wintering Bald Eagle Studies. USFS Rocky Mountain For. and Range Exp. Sta., Tempe, Az.

Black-footed Ferret:

Berger, S. 1977. Memo entitled "Black-footed Ferret Recovery Plan" from State Director, BLM, New Mexico, to Area Manager, USFWS, Pierre, South Dakota, listing sightings for this region.

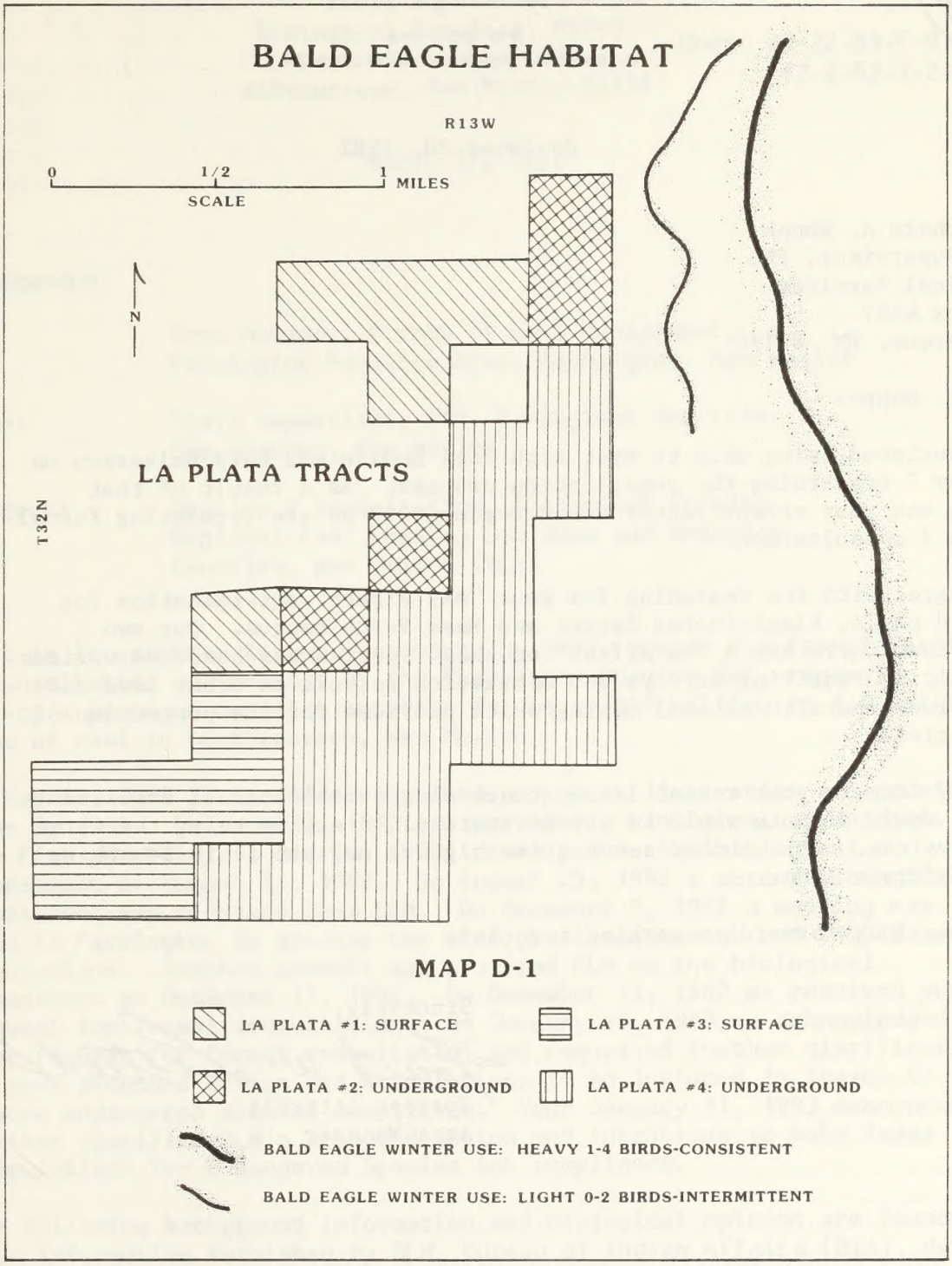
Berger, S. 1981. Personal conversations with BLM wildlife staff to the effect that sightings should be unconfirmed.

New Mexico Dept. of Game and Fish, 1979. Handbook of Species Endangered in New Mexico.

Sverdrup and Parcel and Associates. 1980. Investigations of Potential Black-footed Ferret Habitat in the Vicinity of Crownpoint, New Mexico. 801 N. Eleventh St., St. Louis, Mo. 63101. Report done for EPA.

Colorado River Squawfish: New Mexico Dept. of Game and Fish. 1979. Handbook of Species Endangered in New Mexico.

Mesa-verde Cactus: Knight, D.J. 1981. Rare, Threatened, Endangered and Other Plants of Concern in the BLM Chaco-San Juan Planning Area of Northwestern New Mexico. N. M. Dept. of Nat. Res., N. M. Heritage Program, Santa Fe, New Mexico.


BALD EAGLE HABITAT
R13W
0
1/2
1
MILES
SCALE
N
LA PLATA TRACTS
T32N
MAP D-1
LA PLATA #1: SURFACE
LA PLATA #3: SURFACE
LA PLATA #2: UNDERGROUND
LA PLATA #4: UNDERGROUND
BALD EAGLE WINTER USE: HEAVY 1-4 BIRDS-CONSISTENT
BALD EAGLE WINTER USE: LIGHT 0-2 BIRDS-INTERMITTENT

IN REPLY REFER TO

United States Department of the Interior

6800
3400

BUREAU OF LAND MANAGEMENT

P.O. BOX 568
FARMINGTON, NEW MEXICO 87401

December 20, 1982

Mr. Richard A. Hoppe
Field Supervisor, FWS
Ecological Services
P.O. Box 4487
Albuquerque. NM 87196

Dear Mr. Hoppe:

We appreciated being able to meet with Joel Medlin and Gary Halverson on December 7 concerning the consultation process. As a result of that meeting and your recent letter dated December 13 we are requesting formal Section 7 consultation.

We do agree with the reasoning for your "may affect" determination for the bald eagle, black-footed ferret and Mesa Verde cactus. Our own belief that there was a "no affect" on these species was based on various BLM policies requiring surveys and mitigation as well as other laws and regulations specific to coal mining which provides for the protection of T&E species.

The only item in your recent letter concerning our biological assessment that we would dispute would be the estimate of 30 eagles using the three river systems. This number seems quite high to us, but it is something we can address later.

Again, we look forward to working together.

Sincerely,

Forrest W. Littrell

Forrest Littrell
Area Manager

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Field Supervisor
Ecological Services, USFWS
Post Office Box 4487
Albuquerque, New Mexico 87196

Cons. #2-22-83-F-013
(2-2-82-I-214)

March 17, 1983

Memorandum

To: Area Manager, Bureau of Land Management, Farmington Resource Area, Farmington, New Mexico

From: Field Supervisor, FWS, Ecological Services, Albuquerque, New Mexico

Subject: Section 7 Consultation, Biological Opinion, Regional Coal Leasing San Juan and McKinley Counties, New Mexico (BLM)

This is in response to your December 20, 1982 request for formal Section 7 consultation as provided by the Endangered Species Act, regarding your Agency's proposed decision to offer for lease 129 million to 1.9 billion tons of coal in northwestern, New Mexico.

On May 19, 1982 your office requested a species list; which was provided June 3, 1982. On June 23, 1982 you provided a biological assessment. The Fish and Wildlife Service (FWS) commented on the biological assessment on August 11, 1982. On August 25, 1982 a second biological assessment was received from BLM. On December 9, 1982 a meeting was held in Farmington to discuss the biological assessment and compliance regulations. Another comment was provided BLM on the biological assessment on December 13, 1982. On December 23, 1982 we received your request for formal consultation. On January 18, 1983 we acknowledged your request for formal consultation and requested further clarification on your proposed action and stipulations to be included in leases to insure endangered species compliance. Your January 31, 1983 memorandum further clarified BLM's proposed action and intentions to make lease stipulations for Endangered Species Act compliance.

The following background information and biological opinion are founded upon information furnished by BLM, Bureau of Indian Affairs (BIA), data in our files and discussions with persons familiar with endangered species and proposed coal leasing.

The decision to proceed with the San Juan Regional Coal Leasing will culminate in a lease sale in December 1983. Leasing will result in an undetermined number of mines that may be developed in proximity to the bald eagle (Haliaeetus leucocephalus) black-footed ferret (Mustela nigripes and Mesa Verde cactus (Sclerocactus mesae-verde).

BACKGROUND INFORMATION

The proposed Federal Action under consultation is BLM's decision to offer 129 million to 1.94 billion tons of coal for competitive lease and to issue leases for all or a portion of the 26 Preference Rights Lease Applications (PRLA's). The potential coal lease tracts and PRLA's are located in San Juan and McKinley counties in northwestern, New Mexico.

The end result of the lease sale will be awarding of leases and mining of surface and underground coal mines in the San Juan Coal Region. Additional reviews and decisions to issue mine permits under authority of the Surface Mining and Reclamation Control Act will be required on a case by case basis for individual mines. These reviews and permits will be under the purview of the Office of Surface Mining (OSM), and the surface land management agencies (BLM or BIA). Thus there will be additional opportunity to comply with Section 7 of the Endangered Species Act during review and issuance of individual mine permits.

The proposed action involves five different alternatives: 1) the No Action Alternative includes issuance of all or a portion of the 29 PRLA's, with the potential to disturb 31,910 surface areas; 2) the By-pass Alternative includes 8 coal tracts; 3) the Minimum Surface Owner Conflict Alternative includes 11 tracts; 4) the Target Alternative proposes 24 tracts; and 5) the High Alternative offers for competitive lease a total of 39 tracts, with the potential to disturb 68,641 surface acres. For the purpose of this consultation we have considered the above alternatives and potential effects as displayed by BLM's San Juan Regional Coal Environmental Impact Statement dated November, 1982, and the Environmental Assessment for Coal Preference Right Leasing, New Mexico, dated September, 1981 (PRLA EA). Our biological opinion is formulated on the High Alternative thus insuring that all potential impacts are considered, including the potential to issue all competitive leases as well as the PRLA's.

On March 16, 1978 the bald eagle was listed as endangered in the conterminous United States except for several northwest and Great Lakes States where it was designated as threatened (43 FR 6233). Reasons for decline of this species include habitat loss, pesticide-induced reproductive failure and human disturbance. The bald eagle utilizes aquatic habitats in the San Juan Basin during the winter period, November through February. Significant winter use occurs mainly at Navajo Reservoir and on the Animas River. Other aquatic habitats such as the San Juan and La Plata Rivers, adjacent wetlands and open water areas are also used for foraging, resting and roosting.

The following potential impacts to bald eagles and their winter use areas which could result from coal leasing were considered: 1) loss of habitat to mining; 2) direct diversion of water from Navajo Reservoir or the San Juan River; 3) loss of riverine and wetland habitats due to increased demand for social and economic development projects such as housing, flood control, water supply and transportation; and 4) human disturbance associated with increased population.

Bald eagle use in coal tracts or PRLA areas proposed for leasing has not been documented. Bald eagles utilize aquatic habitat generally not found in lease areas. It is possible for an occasional eagle to forage in or near lease or PRLA areas. Even though about 110,000 acres is potentially planned for leasing, only a portion of that area would be initially mined. The normal strip mining process involves mining a portion of the tract with subsequent reclamation of mined areas as new mining proceeds. Thus, it is unlikely that bald eagles would be directly affected by the strip mining.

BLM's draft Coal Leasing EIS and PRLA EA indicates over 12,000 acre-feet of water per year will be required for mining and reclamation. The source of this water is unknown at this time, and plans for obtaining water will be formulated by industry during mine plan development. Surface waters in the San Juan Regional Coal area are fully appropriated at this time. The PRLA EA indicates some mining companies plan to use ground water and intermittent surface waters available in or near coal tracts for mining and reclamation; thus, significant habitat impacts at Navajo Reservoir and the San Juan River are not likely, and it is unlikely that bald eagles would be affected by diversion of water.

Coal leasing will result in increased demands for housing, water supply, transportation, flood control and other social or economic development projects (Chapter 3, BLM's Draft Coal Leasing EIS). Potential for impacts to bald eagle winter use areas on the San Juan River, La Plata River, and lower portions of the Animas River near the cities of Bloomfield, Farmington, Shiprock and Aztec were considered. These riverine and adjacent wetland areas presently do not receive significant eagle use; thus impacts to eagles are not likely to occur. Major economic development projects will likely be evaluated individually for effects on endangered species; and compliance with the clean Water Act, and Wetland and Floodplain Executive Orders which mandate aquatic habitat protection.

Aquatic related recreation demand in the San Juan Region is expected to increase about 18 percent by the year 2019 (Chapter 3, pages 3-16 thru 25, BLM's Draft San Juan Basin Cumulative Overview, November 1982). Increased recreation use is expected at Navajo Reservoir and along the San Juan, Animas and La Plata Rivers where there is public access. Human disturbance will likely affect bald eagle winter use by displacing eagles. However, most of the present and projected recreation use is expected to occur during summer months when eagles are not present in large numbers. Eagle use of the Animas River occurs mostly above the City of Aztec where there is less public access. Access for hunting on the Animas, La Plata and San Juan Rivers is limited. Illegal shooting or other law enforcement problems associated with bald eagles has not been a problem in the area. In addition, BLM is initiating planning for road closures to reduce public access to bald eagle winter use areas.

In summary, direct and indirect habitat losses are not expected to affect bald eagle winter use areas. Increased recreation has a potential to affect wintering bald eagle use at Navajo Reservoir and in riverine habitats. These effects are not expected to be significant, because most recreation will occur in non-winter periods, public access

to riverine areas is limited, and public access restrictions are being planned.

The black-footed ferret was listed as endangered on March 11, 1967 (32 FR 4001). Reasons for its decline include habitat loss and prairie dog control programs. While no recent, verified sightings of black-footed ferrets have been made in New Mexico, there is potential that the ferret may exist in northwestern, New Mexico. Recent discoveries of black-footed ferrets in Wyoming during fall of 1981 and throughout 1982 give added impetus to requiring surveys for ferrets. Potential habitat for ferrets in New Mexico is considered to be prairie dog towns.

BLM data indicates that 29 prairie dog towns occur in the immediate area of potential coal developments. To date, only two of these towns have been surveyed for black-footed ferrets. Surveys for ferrets should be conducted prior to surface disturbance. BLM has indicated that surveys will be required as lease stipulations.

The Mesa Verde cactus was listed as threatened on November 29, 1979 (44 FR 61471). Reasons for listing this species as threatened include limited distribution, collection by cactus collectors, habitat destruction and potential threats resulting from energy development activities. The primary distribution of Mesa Verde cactus is in north central San Juan County, New Mexico. Another small population is located near Sheep Springs, in southwestern San Juan County. Potential habitat includes dry exposed hillsides of Mancos or Fruitland clays between 4,800 and 5,500 feet in elevation. These habitats may occur in the potential coal lease and PRLA areas. No surveys for Mesa Verde cactus have been conducted to date in these areas. BLM has indicated lease stipulations will require surveys to determine occurrence of the cactus in mine areas.

BIOLOGICAL OPINION

Based on this evaluation, it is my biological opinion that the proposal to offer for lease 129 million to 1.9 billion tons of coal in northwestern New Mexico is not likely to jeopardize the continued existence of the bald eagle, black-footed ferret and Mesa Verde cactus.

Because there is potential for occurrence of the black-footed ferret and the Mesa Verde cactus in the proposed lease and PRLA areas and leasing could affect these species if they were found to be present, we endorse BLM's plans to require appropriate surveys as stipulations on leases. If these surveys reveal the occurrence of the black-footed ferret or the Mesa Verde cactus in any lease area, appropriate consultation should be initiated by OSM, BLM or BIA during permit planning stages of mine development.

Further consultation is not required unless new information becomes available that discusses the bald eagle, black-footed ferret or Mesa Verde cactus. If new species are listed that may be affected by this action or the proposed action is modified in a manner not considered in this biological opinion further consultation should be initiated.

Your consideration of threatened and endangered species is appreciated. Please contact this office if you have any questons about this biological opinion.

R.A. Hoppe

Richard A. Hoppe

cc:
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, FWS, Office of Endangered Species, Washington, D.C.
Regional Director, FWS, AEV, SE, Albuquerque, New Mexico

APPENDIX E
TRANSPORTATION AND LAND USES

APPENDIX E
TRANSPORTATION AND LAND USES

APPENDIX E

TRANSPORTATION AND LAND USES

APPENDIX E-1

RIGHTS-OF-WAY LOCATED ON PRLAs

PRLA Number	Right-of-Way Type	Right-of-Way Serial Number	Dimension (Feet)	Acreage
NM 585	Natural Gas Pipeline (Application)	NM 18724	50 x 9,000	10.33
	Powerline	NM 23125	20 x 7,000	3.21
	Powerline	NM 26950	20 x 4,000	1.84
	Powerline	NM 29865	20 x 10,300	4.73
	Natural Gas Pipeline	NM 042741	50 x 6,900	7.92
	Telephone Line and Pipeline	NM 066400	70 x 8,400	13.50
NM 3752	Proposed Star Lake Railroad - Atchison-Topeka and Santa Fe Railroad Co.[a/]	NM 29324	150-200 x 3,516.36	15.41
NM 3753	N/A			
NM 3754	Powerline	NM 12221	20 x 1,800	.83
	Proposed Star Lake Railroad - Atchison-Topeka and Santa Fe Railroad Co.[a/]	NM 29324	150-200 x 6,331.59	23.25
NM 3755	Powerline	NM 0556114	50 x 5,500	6.31
NM 3834	N/A			
NM 3835	N/A			
NM 3836	N/A			
NM 3837	N/A			
NM 3838	N/A			
NM 3918	Powerline	NM 0556114	60 x 15,300	21.07
NM 3919	Powerline	NM 0556114	60 x 3,900	5.37
NM 6801	Natural Gas Pipeline	NM 022491	50 x 6,000	6.89
	Natural Gas Pipeline	NM 022522	50 x 6,000	6.89
	Natural Gas Pipeline	NM 33177	50 x 6,000	6.89
NM 6802	Powerline (Application)	NM 34119	50 x 2,600	2.98
NM 6804	Powerline	NM 0556114	60 x 8,300	11.43
NM 7235	N/A			
NM 8128	Road Right-of-way	NM 30254	35 x 3,300	2.65
NM 8129	N/A			
NM 8130	Natural Gas Pipeline	NM 09148	50 x 2,900	3.33
NM 8715	Natural Gas Pipeline	NM 042741	50 x 2,500	2.87
	Powerline	NM 0559354	150 x 9,600	33.06
	Natural Gas Pipeline & Telephone Line	NM 066400	70 x 2,800	4.50
NM 8717	N/A			
NM 8745	N/A			
NM 9764	N/A			
NM 11670	Natural Gas Pipeline, Powerline, & Road	NM 34781	80 x 4,000	7.35
NM 11916	N/A			

Note: [a/]Proposed Facility - pending private land easement acquisition. Federal right-of-way grant issued 12-05-79.

APPENDIX E-2

RIGHTS-OF-WAY LOCATED ON COMPETITIVE COAL LEASE TRACTS

Tract Name	Right-of-Way Type	Right-of-Way Serial Number	Dimension (Feet)	Acreage
La Plata #1 Bypass	Natural Gas Pipeline	NM 26540	50 x 1,000	1.15
La Plata #2 [a]	N/A			
La Plata #3	N/A			
La Plata #4	N/A			
Johnson Trading Post	Natural Gas Pipeline (Mapco)	NM 36230	50 x 900	1.03
	Natural Gas Pipeline	NM 16556	50 X 900	1.03
	Natural Gas Pipeline	NM 17176	50 x 13,600	15.61
	Natural Gas Pipeline (Apln.)	NM 18724	50 x 13,500	15.60
	Powerline	NM 8601	20 x 3,900	1.79
	Powerline	NM 26729	20 x 8,400	3.86
	Powerline	NM 27146	20 x 1,600	.73
	Powerline	NM 3742	150 x 1,400	4.82
	Road	NM 30233	25 x 1,200	.69
Star Lake East #1	Powerline	NM 3742	150 x 8,200	28.24
Star Lake East (LC) [a]	Powerline	NM 3742	150 x 6,500	22.38
	Powerline	NM 29865	20 x 2,700	1.24
Star Lake West #2	Natural Gas Pipeline	NM 042741	50 x 4,500	5.17
Bypass	Natural Gas P/L and Telephone Line	SF 066400	70 x 4,500	7.23
Kimbeto #1 [a]	Powerline	NM 0556114	60 x 3,300	4.55
Kimbeto #2 Bypass	N/A			
Nageezi [a]	Natural Gas Pipeline	————	50 x 8,500	9.76
Gallo Wash #1 Bypass	Natural Gas Pipeline	NM 09148	50 x 1,100	1.26
Gallo Wash #2 [a]	Natural Gas Pipeline (Proposed Shell CO_2 Line)	NM 29081	40 x 1,200	1.10
	Natural Gas Pipeline	NM 042739	50 x 3,100	3.56
	Natural Gas Pipeline	NM 0558168	50 x 3,100	3.56
	Natural Gas P/L and Telephone Line	SF 066400	70 x 3,100	4.98
	Natural Gas P/L and Powerline, & Road	NM 34781	80 x 1,200	2.20
	Powerline	NM 0559354	40 x 4,600	4.22
	Powerline	NM 27270	20 x 3,200	1.47
Bisti #1	Powerline (Apln.)	NM 34119	50 x 14,500	16.64
Bisti #2	Natural Gas Pipeline	NM 022491	50 x 6,000	6.89
	Natural Gas Pipeline	NM 022522	50 x 6,000	6.89
	Natural Gas Pipeline	NM 33177	50 x 6,000	6.89
	Powerline	NM 12221	20 x 500	0.23
	Powerline	NM 23125	20 x 2,000	0.92
Bisti #4 A & B	N/A			
Bisti #6 Bypass	Powerline	NM 12221	20 x 1,300	0.60
Lee Ranch East	Powerline	NM 0263365	100 x 5,800	13.32
Lee Ranch Middle	Powerline	NM 063642	100 x 5,800	13.32

Tract Name	Right-of-Way Type	Right-of-Way Serial Number	Dimension (Feet)	Acreage
Lee Ranch West	Powerline [a]	NM 063642	100 x 5,900	13.54
	Powerline [a]	NM 0263365	100 x 12,600	28.93
Divide	Proposed Star Lake Railroad: Atchison- Topeka and Santa Fe Railroad Co. [b]	NM 29324	225 x 1,022	5.28
	Powerline (230 KV) [c]	----------	100 x 3,900	8.95
	Four Corners-Ambrosia-Pajarito Powerline (500 KV R/W Issued) [a]	NM 41002	200 x 3,900	17.91
	Continental Divide Natural Gas Pipeline System-Proposed By Transwestern Pipeline Corp. [d]	NM 53144	40 x 3,000	2.75
Crownpoint Northeast	Powerline [a]	NM 40364	30 x 22,400	15.43
Crownpoint East	Powerline (230 KV) [c]	----------	100 x 20,800	47.75
	Four Corners-Ambrosia-Pajarito Powerline (500 KV R/W Issued) [a]	NM 41002	200 x 20,800	95.50
Hospah #1 Bypass	Proposed Continental Divide Pipeline System-Transwestern Pipeline Corp. [d]	NM 53144	40 x 9,200	8.45
Hospah #2 [e]	Proposed Star Lake Railroad: Atchison, Topeka and Santa Fe Railroad Co. [b]	NM 29324	200 x 5,839.68	26.81
Catalpa Canyon	N/A			
Sundance	N/A			
Tah-Ha-Bah Well (LC) [e]	N/A			
Hogback	N/A			
Twin Buttes (LC)	Roadway Materials Site - New Mexico State Highway Commission	NM 037898	----------	1.06
Pinehaven (LC)	Powerline [c]	NM 061426	100 x 7,900	18.14
Bread Springs #1 (LC) [e]	N/A			
Bread Springs #2 (LC) [e]	N/A			
Gamerco #1 Bypass	Powerline [c]	----------	50 x 2,600	2.98
Gamerco #1 (LC)	Proposed Con Paso Railroad Route Estimated) [f]	----------	200 x 1,500	6.89
Gamerco #2 (LC)	Proposed Con Paso Railroad (Route Estimated) [f]	----------	200 x 7,700	35.35
	Natural Gas Pipeline [c]	----------	50 x 10,700	12.28
	Powerline (115 KV) [c]	----------	50 x 7,200	8.26
Samson Lake #1 (LC)	Powerline (115 KV) [c]	----------	50 x 13,500	15.50
	Powerline (115 KV) [c]	----------	50 x 17,000	19.51
Samson Lake #2	Powerline (115 KV) [c]	----------	50 x 11,500	13.20
	powerline (115 KV) [c]	----------	50 x 9,400	10.79

Notes: [a] Existing facilities - R-O-W issued - mixed surface ownership (BLM, State, Private, Indian
[b] Proposed facilities - R-O-W issued.
[c] Existing facilities - No BLM administered surface is involved
[d] Proposed facilities - R-O-W application.
[e] Tracts identification for underground mining. Possible exemption from unsuitability criterion (43 CFR 3461.2). Mine plan is necessary for site specific asessment.
[f] Proposed facilities _ application status unknown because no BLM-administered surface is involved.

APPENDIX E-3

LAND USE PROPOSALS ON PRLA's AND COMPETITIVE COAL LEASE TRACTS

PRLA No./ Tract Name	Legal Description	Acreage	Lands Action
NM 3752	T. 23 N., R. 12 W., (NMPM) Sec. 19: Lots 5-20 (all)	650	Ute Mountain Exchange Withdrawal a/
NM 3754	T. 23 N., R. 12 W., (NMPM) Sec. 30: Lots 1-4, E1/2W1/2	640	Ute Mountain Exchange Withdrawal a/
NM 6803	T. 23 N., R. 11 W., (NMPM) Sec. 14: E1/2NE1/4	80	PLO 5721 - Navajo Exchange Withdrawal b/
Kimbeto #2	T. 23 N., R. 10 W., (NMPM) Sec. 13: NE1/4	160	PLO 5721 - Navajo Exchange Withdrawal c/
Nageezi	T. 23 N., R. 10 W., (NMPM) Sec. 6: Lots 3, 4, 5, SE1/4NW1/4 Sec. 8: S1/2	478	PLO 5721 - Navajo Exchange Withdrawal Sec. 6 b/ Sec. 8 c/
Nageezi	T. 24 N., R. 10 W., (NMPM) Sec. 21: S1/2SW1/4 Sec. 30: SE1/4 Sec. 33: SE1/4	400	PLO 5721 - Navajo Exchange Withdrawal d/
Twin Buttes	T. 14 N., R. 19 W., (NMPM) Sec. 26: NW1/4	160	PLO 5721 - Navajo Exchange Withdrawal c/
Bisti #1	Entire Tract	3,713	Public Law 96-475 - Bisti Coal Lease Exhange a/
Bisti #6	T. 23 N., R. 13 W., (NMPM) Sec. 15: N1/2NW1/4	80	Ute Mountain Exchange Withdrawal a/
Nageezi	T. 24 N., R. 11 W., (NMPM) Sec. 34: N1/2	320	Ute Mountain Exchange Withdrawal a/

Note: a/ Proposed for Exchange.
b/ Not included in Exchange Legislation.
c/ Scheduled for Exchange - Mining Claims are located on these lands.
d/ Included in Exchange Legislation.

APPENDIX E-4

TRANSPORTATION FACILITIES LOCATED ON FEDERAL COAL LANDS (PRLAs)

PRLA Number	Transportaion Type And Agency or Company	Serial Number/ Road Number	Dimension (Feet)	Acreage
NM 585	Public Road: Bureau of Indian Affairs	47-A	20 x 9,200	4.22
NM 3752	Star Lake Railroad - Atchison-Topeka and Santa Fe Railroad Co.[a]	NM 29324	150-200 x 3,516.36	15.41
	Public Road: San Juan County	C-15	60 x 7,300	10.06
NM 3753	Public Road: San Juan County	C-15	60 x 8,900	12.26
NM 3754	Star Lake Railroad - Atchison-Topeka and Santa Fe Railroad Co.[a]	NM 29324	150-200 x 6,331.59	23.25
	Public Road: State of New Mexico Public Road:	371	60 x 1,900	2.62
	San Juan County	C-14	60 x 200	.28
NM 3755	Public Road: San Juan County[b]	A-01	60 x 2,700	3.72
NM 3834	N/A			
NM 3835	Public Road: San Juan County	C-15	60 x 6,000	8.26
NM 3836	Public Road: San Juan County	C-14	60 x 7,600	10.47
NM 3837	Public Road: San Juan County	C-14	60 x 14,900	20.52
NM 3838	N/A			
NM 3918	Public Road: State of New Mexico	56/57	60 x 14,300	19.70
	Public Road: San Juan County	A-09	60 x 8,600	11.85
	Public Road: San Juan County[b]	A-10	60 x 8,500	11.71
NM 3919	Public Road: State of New Mexico	56/57	60 x 3,500	4.82
NM 6801	Public Road: State of New Mexico	371	60 x 5,200	7.16
NM 6802	N/A			
NM 6803	Public Road: San Juan County	C-14	60 x 8,400	11.57
NM 6804	Public Road: State of New Mexico	56/57	60 x 9,500	13.09
	Public Road: San Juan County	A-30	60 x 1,400	1.93
	Public Road: San Juan County[b]	A-27	60 x 200	.28
	Public Road: San Juan County[b]	A-28	60 x 4,000	5.51
NM 7235	N/A			
NM 8128	Public Road: San Juan County[b]	A-16	60 x 9,700	13.36
NM 8129	N/A			
NM 8130	Public Road: Bureau of Indian Affairs	46	20 x 4,900	2.25
NM 8751	N/A			
NM 8717	N/A			
NM 8745	N/A			
NM 9764	N/A			
NM 11670	N/A			
NM 11916	N/A			

Notes: [a]Proposed facility - pending private land easement acquisition. Federal right-of-way grant issued 12/05/79.
[b]Roads maintained by San Juan County, but not considered county roads.

APPENDIX E-5

TRANSPORTATION FACILITIES LOCATED ON COMPETITIVE COAL LEASE TRACTS

Tract Name	Transportation Type and Agency or Company	Serial Number/ Road Number	Dimension (Feet)	Acreage
La Plata #1 Bypass	N/A			
La Plata #2[a]	N/A			
La Plata #3	N/A			
La Plata #4	N/A			
Johnson Trading Post	N/A			
Star Lake East #1	Public Road: BIA	47	20 x 2,200	1.01
	Public road: BIA	47-A	20 x 7,200	3.31
Star Lake East (LC)[a]	Public Road: BIA	47	20 x 7,000	3.21
	Public Road: BIA	47-A	20 x 3,300	1.52
Star Lake West #2 Bypass	N/A			
Kimbeto #1[a]	Public Road: San Juan County	A-27	60 x 13,500	18.60
	Public Road: San Juan County	A-30	60 x 5,000	6.89
Kimbeto #2 Bypass	N/A			
Nageezi[a]	Public Road: San Juan County	C-14	60 x 2,600	3.58
Gallo Wash #1 Bypass	N/A			
Gallo Wash #2[a]	Public Road: San Juan County	A-15	60 x 3,100	4.27
Bisti #1	Public Road: San Juan County	C-15	60 x 9,000	12.40
Bisti #2	Public Road: State of New Mexico	371	60 x 3,500	4.82
Bisti #4 A & B	N/A			
Bisti #6 Bypass	Public Road: State of New Mexico	371	60 x 3,200	4.41
Lee Ranch East	Public Road: McKinley County	19	60 x 1,100	1.52
Lee Ranch Middle	N/A			
Lee Ranch West	N/A			
Divide	Star Lake Railroad: Atchison-Topeka and Santa Fe Railroad Co.[a]	NM 29324	225 x 1,022	5.28
	Public Road: BIA	48-C	20 x 1,300	0.60

Tract Name	Transportation Type and Agency or Company	Serial Number/ Road Number	Dimension (Foot)	Acreage
Crownpoint Northeast	Public Road: State of New Mexico	56/57	60 x 17,500	24.10
	Public Road: State of New Mexico	371	60 x 11,900	16.39
Crownpoint East	Public Road: BIA	48-A	20 x 13,000	5.97
Hospah #1 Bypass	N/A			
Hospah #2[a]	Star Lake Railroad: Atchison-Topeka and Santa Fe Railroad Co.[b]	NM 29324	200 x 5,839.68	26.81
Chico Wash South (LC	Public Road: McKinley County	C-19	60 x 21,400	29.48
Catalpa Canyon	N/A			
Sundance	N/A			
Tah-Ha-Bah Well (LC)[a]	N/A			
Hogback	N/A			
Twin Buttes (LC)	Public Road: McKinley County	2	60 x 3,000	4.13
	Public Road: McKinley County	26	60 x 15,000	20.66
Pinehaven (LC)	Public Road: State of New Mexico	32	60 x 5,300	7.30
	Public Road: McKinley County	24	60 x 400'	0.55
Bread Springs #1 (LC)[a]	N/A			
Bread Springs #2 (LC)[a]	N/A			
Gamerco #1 Bypass	N/A			
Gamerco #1 (LC)	Proposed Con Paso Railroad (Route Estimated)[c]	————	200 x 1,500	6.89
Gamerco #2 (LC)	Proposed Con Paso Railroad (Route Estimated)[c]	————	200 x 7,700	35.35
Samson Lake #1 (LC)[a]	Public Road: McKinley County	1a	60 x 11,500	15.84
	Public Road: McKinley County	1d	60 x 12,200	16.80
Samson Lake #2	Public Road: McKinley County	1a	60 x 2,000	2.75
	Public Road: McKinley County	1d	60 x 2,500	3.44

Notes: [a] Tracts identified for underground mining. Possible exemption from unsuitability criterion (43 CFR 3461.2). Mine plan is necessary for site-specific assessment.
[b] Proposed facility - pending private land easement acquisition. Federal right-of-way grant issued 12/05/79.
[c] Proposed facility - application status unknown because no BLM-administered surface is involved.

APPENDIX E AMERICAN INDIAN CONCERNS

APPENDIX F
AMERICAN INDIAN CONCERNS

APPENDIX F

AMERICAN INDIAN CONCERNS

APPENDIX F - 1
NAVAJO OCCUPANCIES ON THE PRLAs

Lease Application No.	Legal Description	Surface Ownership	Residence Group	Head of Household	Livestock Permit	IMPROVEMENTS: No. & Type of Residence	IMPROVEMENTS: Associated Structures	IMPROVEMENTS: Other
SURFACE MINEABLE PRLAs								
NM-585	T. 19 N., R. 5 W.							
	Sec. 3: S½	Public Domain	Group A	A1: Rita Mace A2: Thomas Mace		1 frame house 1 frame house	Corrals, Shed	Water line, fenced garden
	Sec. 6: SW¼	Homestead	Group B	B1: Isabelle Salzar, Manuel Salzar	BIA-Tribe	2 frame houses	Fences, barn, corrals, shed	
				B2: Sam & Barbara Peshlakai	BIA-Tribe	1 trailer house	Church, Shelter	
	Sec. 9: NE¼	Indian Allotment (No. 062008)	Group C	C1: Raymond & Irene Ignacio	BIA-Tribe	2 frame houses	Corrals, sheds	2 acre farm
	SUBTOTALS	3 RESIDENCE GROUPS		5 HOUSEHOLDS		7 RESIDENCES		
NM-8717	T. 20 N., R. 5 W.							
	Sec. 35: NE¼	Indian Allotment (No. 434)	Group A	A1: Marie Sandoval A2: Velma Toledo A3: Wayne Toledo	BIA-Tribe	1 hogan 1 frame house 1 frame house	Corrals, Shed	Water line
	SUBTOTALS	1 RESIDENCE GROUP		3 HOUSEHOLDS		3 RESIDENCES		
NM-8715	T. 20 N., R. 7 W.							
	Sec. 3: SE¼	Indian Withdrawal (PLO 2198)	Group A	A1: Tom Tomasito	BIA-Tribe	2 frame houses		
	SUBTOTALS	1 RESIDENCE GROUP		1 HOUSEHOLD;		2 RESIDENCES		

APPENDIX F-1

(CONTINUED)

Lease Application No.	Legal Description	Surface Ownership	Residence Group	Head of Household	Livestock Permit	IMPROVEMENTS No. & Type of Residence	Associated Structures	Other
NM-8130	T. 20 N., R. 7 W.,							
	Sec. 2: NE¼	Indian Allotment (No. 302)	Group A	A1: Julia Tsosie	BIA-Tribe	1 frame house		
				A2: Martha Ramone		2 hogans 1 frame house		
				A3: Alice Ramone		1 hogan	Corrals	
				A4: Albert & Martha Toledo	BIA-Tribe	1 frame house		
				A5: Chee Ramone		2 hogans		
	Sec. 12: NE½	Public Domain	Group B	B1: Marvin & Anna Dennison	BIA-Tribe	1 hogan 1 frame house		
				B2: Alice Jim	BIA-Tribe	1 hogan	Corrals	
				B3: Jimmie Lamone	BIA-Tribe	1 frame house		
	SUBTOTALS	2 RESIDENCE GROUPS		8 HOUSEHOLDS		12 RESIDENCES		
NM-8128	T. 21 N., R. 8 W.,							
	Sec. 10: SE¼	Indian Allotment (No. 315)	Group A	A1: Mrs. Charley Brown	BIA-Tribe	1 hogan 1 frame house	Corrals, sheds	Fenced garden
				A2: Hoskie Brown		1 hogan 1 frame house		
	Sec. 15: NE¼	Indian Allotment (No. 308)	Group B	B1: Jack & Nancy Thomas	BIA-Tribe	2 hogans 1 frame house 1 trailer house	Corral	Fenced garden
	Sec. 15: NW¼	Indian Allotment (No. 312)	Group C	C1: Bert Mescal	BIA-Tribe	1 frame house		
	Sec. 22: SW¼	Public Domain	Group D	D1: Lucille Cayaditto	BIA-Tribe	1 frame house	Corrals	

APPENDIX F-1

(CONTINUED)

Lease Application No.	Legal Description	Surface Ownership	Residence Group	Head of Household	Livestock Permit	IMPROVEMENTS No. & Type of Residence	IMPROVEMENTS Associated Structures	IMPROVEMENTS Other
NM-8128 (Cont'd)	Sec. 34: S½	Indian Allotment (No. 079848)	Group E	E1: Elise Mitchell		1 frame house		
				E2: Mary Nelson	BIA-Tribe	1 frame house		Red dog gravel
				E3: Shirley Nelson		1 frame house		
				E4: Kee Nelson		1 frame house		
	SUBTOTALS	5 RESIDENCE GROUPS		9 HOUSEHOLDS		14 RESIDENCES		
NM-3918	T. 22 N., R. 10 W.							
	Sec. 17: SW¼	Public Domain	Group A	A1: Andy Tsosie	BLM	1 frame house	Corral	
	Sec. 19: SW¼	Public Domain	Group B	B1: Willie Yazzie	BLM	1 frame house	Corrals	
						1 trailer house		
	Sec. 23: SE¼	Public Domain	Group C	C1: Cecil Werito	BLM	1 frame house	Corrals,	
				C2: Neilwood Willeto	BLM	1 frame house	Stulls,	
				C3: Jim Beyale	BLM	2 frame houses	Sheds	
	Sec. 24: W½	Public Domain	Group D	D1: Mary Trujillo		1 frame house	Corrals,	
				D2: Neilwood Willeto	(Cf. above)	2 frame houses	Sheds	
				D3: Jim Beyale	(Cf. above)	1 frame house		
	SUBTOTALS	4 RESIDENCE GROUPS		8 HOUSEHOLDS		11 RESIDENCES		

APPENDIX F-1

(CONCLUDED)

Lease Application No.	Legal Description	Surface Ownership	Residence Group	Head of Household	Livestock Permit	IMPROVEMENTS No. & Type of Residence	IMPROVEMENTS Associated Structures	IMPROVEMENTS Other
UNDERGROUND MINEABLE PRLA								
NM-6801	T. 24 N., R. 13 W							
	Sec. 20: SW¼	Navajo Tribe	Group A	A1: Ben Harris	BIA-Tribe	1 hogan 1 stone house	Corrals, Cellar-type shed	2 acre farm
				A2: Margery Begay	BIA-Tribe	1 trailer house	Corral, Cellar-type shed	
				A3: Anna Begay		1 trailer house	fenced area with loading dock	
				A4: Daniel Begay		1 hogan		
	Sec. 20: NE½	Navajo Tribe	Group B	B1: Unknown		1 frame house	Corral, fence	
	SUBTOTALS	2 RESIDENCE GROUPS		5 HOUSEHOLDS		6 RESIDENCES		
	TOTALS	18 RESIDENCE GROUPS		39 HOUSEHOLDS		55 RESIDENCES		

Source: BLM, Albuquerque District, Farmington Resource Area Files

APPENDIX F-2
NAVAJO OCCUPANCIES ON SURFACE MINEABLE TRACTS ON COMPETITIVE COAL LEASE TRACTS

TRACT NAME	Legal Description	Surface Ownership	No. of Residence(s)	Other
Pinehaven	T. 12 N., R. 18 W.,			
	Sec. 4: NW¼	Tribal Land	1	
	Sec. 4: SW¼	Private	4	
	Sec. 10: NE¼	Tribal Land	2	
	Sec. 11: SW¼	Indian Allotment	3	
	T. 13 N., R. 17 W.,			
	Sec. 16:	Tribal Land	50	
	Sec. 19: NE¼	Private	0	1 Large Building
	Sec. 20: E½	Indian Allotment	3	
	Sec. 21:	Tribal/Indian Allotment	6	
	Sec. 30: NW¼	Tribal Land	9	
	Sec. 31: NE¼	Private	1	
	Sec. 32: SE¼	Tribal Land	1	
	T. 13 N., R 18 W.,			
	Sec. 24: SW¼	Tribal Land	1	
	Sec. 25: SE¼	Tribal Land	1	
	Sec. 28: NW¼	Tribal Land	10	
	Sec. 29: NE¼	Tribal Land	2	
	Sec. 30: SE¼	Private	5	
	Sec. 33; NW¼	Tribal Land	4	
	Sec. 34:	Tribal Land	3	
		SUBTOTAL	106	
Sundance	T. 14 N., R. 17 W.,			
	Sec. 4: SW¼	Indian Allotment	2	
	Sec. 8: NE¼	Indian Allotment	3	
	Sec. 17: NE¼	Tribal Trust	2	
		SUBTOTAL	7	

APPENDIX F-2

(CONTINUED)

TRACT NAME	Legal Description	Surface Ownership	No. of Residence(s)	Other
Bread Springs #1	T. 14 N., R. 17 W.,			
	Sec. 9: SE¼	Tribal Trust	8	
	Sec. 10: NW¼	Public	3	
	Sec. 10: SW¼	Indian Allotment	2	
	Sec. 16: E½	Tribal Trust/State Leased to Tribe	4	
		SUBTOTAL	17	
Twin Buttes	T. 14 N., R. 19 W.,			
	Sec. 2: NW¼	Indian Allotment	5	
	Sec. 3: N½	2198	8	
	Sec. 4: E½	Indian Allotment	4	
	Sec. 9: E½	Indian Allotment	3	
	Sec. 10: SE¼	Indian Allotment	4	
	Sec. 10: NW¼	Indian Allotment	2	
	Sec. 10: SW¼	Indian Allotment	2	
	Sec. 11: W½	2198	12	
	Sec. 14: E½	Indian Allotment	8	
	Sec. 15: W½	2198	8	
	Sec. 22:	Indian Allotment	5	
	Sec. 23: N½	2198	6	
	Sec. 26: NW¼	Indian Allotment	2	
	Sec. 27:	2198	10	
	Sec. 34: NW¼	Tribal Trust	2	
	T. 15 N., R. 19 W.,			
	Sec. 34: NW¼	Indian Allotment	4	
	Sec. 34: SW¼	Indian Allotment	8	
		SUBTOTAL	93	

APPENDIX F-2

(CONTINUED)

TRACT NAME	Legal Description	Surface Ownership	No. of Residence(s)	Other
Divide	T. 15 N., R. 10 W.,			
	Sec. 4: NW¼	Indian Allotment	3	
		SUBTOTAL	3	
Hogback	T. 15 N., R. 18 W.,			
	Sec. 19: SW¼	Indian Allotment	14	
	Sec. 24: NE¼	Private		Trailer court with approximately 150 trailers.
	Sec. 24: NW¼	Indian Allotment	1	
	Sec. 24: SW¼	Indian Allotment	2	
		SUBTOTAL	17	
Samson Lake #2	T. 15 N., R. 19 W.,			
	Sec. 7: NW¼	2198	1	
	Sec. 8: SE¼	Indian Allotment	2	
	T. 15 N., R. 20 W.,			
	Sec. 1: NW¼	2198	4	
	Sec. 2: SW¼	Tribal Trust	4	
	Sec. 12: SE¼	Private	4	
		SUBTOTAL	15	
Gamerco #1 (LC)	T. 16 N., R. 19 W.,			
	Sec. 28: SE¼	Indian Allotment	2	
		SUBTOTAL	2	
Gamerco #1 Bypass (HC)	T. 16 N., R. 19 W.,			
	Sec. 34: SW¼	Indian Allotment	2	
		SUBTOTAL	2	

APPENDIX F-2

(CONTINUED)

TRACT NAME	Legal Description	Surface Ownership	No. of Residence(s)	Other
Crownpoint Northeast	T. 18 N., R. 12 W.,			
	Sec. 6: SE¼	Indian Allotment	3	
	Sec. 8: NW¼	Indian Allotment	1	
	Sec. 20: SW¼	Public	3	b/
	Sec. 22: SW¼	Homestead	2	
	Sec. 26: NE¼	Indian Allotment	4	
	Sec. 26: SE¼	Indian Allotment	1	
	Sec. 26: NW¼	Indian Allotment	2	
	Sec. 28: NE¼	Indian Allotment	1	
	Sec. 28: SE¼	Indian Allotment	7	
	Sec. 28: SW¼	Indian Allotment	4	
	Sec. 30: NE¼	Indian Allotment	1	
	Sec. 30: NW¼	Indian Allotment	2	
	Sec. 31: NE¼	Homestead	1	
	T. 18 N., R. 13 W.,			
	Sec. 22: SE¼	Indian Allotment	4	
	Sec. 22: SW¼	Indian Allotment	1	
		SUBTOTAL	37	
Johnson Trading Post	T. 19 N., R. 3 W.,			
	Sec. 7: NW¼	Indian Allotment	7	
	T. 19 N., R. 4 W.,			
	Sec. 9: NE¼	Public	1	b/
		SUBTOTAL	8	
Crownpoint East	T. 17 N., R. 11 W.,			
	Sec. 1: NE¼	Indian Allotment	1	
	Sec. 2: SW¼	Indian Allotment	4	
	Sec. 4: SW¼	Indian Allotment	1	
	Sec. 11:	2198	11	
	Sec. 14: SE¼	Tribal Trust	4	
	Sec. 22: NE¼	Indian Allotment	3	
	Sec. 23: NE¼	2198	1	
		SUBTOTAL	25	

APPENDIX F-2

(CONTINUED)

TRACT NAME	Legal Description	Surface Ownership	No. of Residence(s)	Other
STAR LAKE EAST #1	T. 19 N., R. 5 W.,			
	Sec. 5: NE¼	Public	2	
	T. 20 N., R. 5 W.,			
	Sec. 33: SE¼	Public	1	
	Sec. 34: NW¼	Public	2 b/	
	Sec. 35: NW¼	Indian Allotment	6	
		SUBTOTAL	11	
Bisti #6	T. 23 N., R. 13 W.,			
	Sec. 15: NE¼	Indian Allotment	1	
	Sec. 17: NW¼	Indian Allotment	1	
		SUBTOTAL	2	
Bisti #2	T. 24 N., R. 13 W.,			
	Sec. 29: NW¼	Navajo Tribe	0	1 hogan used by Project Concern for dental work
	Sec. 31: NE¼	Public	0	2 buildings belonging to United Methodith Mission
		SUBTOTAL	0	
		TOTAL RESIDENCES	345	

Source: BLM, Albuquerque District, Farmington Resource Area Files

Note: a/ Unoccupied tracts: Catalpa Canyon, Lee Ranch East, Lee Ranch Middle, Lee Ranch West, Hospah #1, Star Lake West #2, Gallo Wash #1, Kimbeto #2, Bisti #1, Bisti #4, La Plata #1, La Plata #3.

b/ Located on or near the boundary of lands included in the proposed Navajo Exchange (See DOI, BLM, 1979).

APPENDIX F-3

NAVAJO OCCUPANCIES ON UNDERGROUND MINEABLE COMPETITIVE COAL LEASE TRACTS a/

TRACT NAME	LEGAL DESCRIPTION	SURFACE OWNERSHIP	NO. OF RESIDENCE(S)
Tah-Ha-Ba Well	T. 14 N., R. 17 W.,		
	Sec. 6: E½	Tribal Trust	4
	Sec. 6: NW¼	Tribal Trust	3
	T. 14 N., R. 18 W.,		
	Sec. 3: SE¼	2198	2
	Sec. 10: NW¼	Indian Allotment	5
	Sec. 14: NE¼	Indian Allotment	3
	Sec. 14: NW¼	Indian Allotment	4
		SUBTOTAL	21
Gamerco #2	T. 16 N., R. 19 W.		
	Sec. 27: SW¼	Private	3
	Sec. 28: SE¼	Indian Allotment	3
	Sec. 28: SW¼	Indian Allotment	4
	Sec. 30: SE¼	Indian Allotment	5
	Sec. 32: NE¼	Indian Allotment	5
	Sec. 32: NW¼	Indian Allotment	6
	Sec. 34: NE¼	Indian Allotment	1
	Sec. 34: NW¼	Indian Allotment	8
		SUBTOTAL	35
Samson Lake #1	T. 15 N., R. 19 W.,		
	Sec. 7: SW¼	Tribal Fee	2
	Sec. 8: SE¼	Indian Allotment	5
	Sec. 8: SW¼	Indian Allotment	6

APPENDIX F-3

(CONTINUED)

TRACT NAME	LEGAL DESCRIPTION	SURFACE OWNERSHIP	NO. OF RESIDENCE(S)
Samson Lake #1 (Cont'd)	T. 15 N., R. 20 W.		
	Sec. 1: E½	2198	16
	Sec. 12: NE¼	Private	2
	T. 16 N., R. 20 W.,		
	Sec. 36: SE¼	Indian Allotment	2
		SUBTOTAL	33
Star Lake East (LC)	T. 20 N., R. 5 W.,		
	Sec. 30: SW¼	2198	1
		SUBTOTAL	1
Gallo Wash #2	T. 21 N., R. 8 W.,		
	Sec. 10: NE¼	Public	3 b/
	Sec. 11: NW¼	Public	3 b/
		SUBTOTAL	6
Kimbeto #1	T. 22 N., R. 10 W.,		
	Sec. 2: NW¼	Indian Allotment	2
	Sec. 2: SW¼	Indian Allotment	2
	Sec. 10: NE¼	Indian Allotment	2
	Sec. 11: NW¼	Indian Allotment	2
		SUBTOTAL	8

APPENDIX F-3

(CONTINUED)

TRACT NAME	LEGAL DESCRIPTION	SURFACE OWNERSHIP	NO. OF RESIDENCE(S)
Nageezi	T. 23 N., R. 10 W.,		
	Sec. 8: SW¼	2198	1
	T. 24 N., R. 10 W.,		
	Sec. 28: NE¼	Indian Allotment	2
	Sec. 29: NW¼	Indian Allotment	1
	Sec. 30: NE¼	Public	1
	Sec. 34: SW¼	Indian Allotment	1
		SUBTOTAL	6
		TOTAL RESIDENCES	110

Source: BLM, Albuquerque District, Farmington Resource Area Files

Note: a/ Unoccupied tracts: Bread Springs #2, Hospah #2, La Plata #2, La Plata #4.
b/ Located on lands included in the proposed Navajo Exchange (See DOI, BLM, 1979).

APPENDIX F-4
NAVAJO GRAVESITES IN THE EIS REGION a/

Lease Application No./Tract Name	Legal Description b/	Surface Ownership	No. of Graves
PRLAs			
Surface Mineable			
NM-8128	T. 21 N., R. 8 W.	Indian Allotment/2198	2
NM-3918	T. 22 N., R. 10 W.	Public	4
Underground Mineable			
NM6803	T. 23 N., R. 11 W.	Public/Indian Allotment	4
NM-3836	T. 23 N., R. 11 W.	Public	1
			SUBTOTAL 11
Competitive Tracts (All Surface Mineable)			
Crownpoint Northeast	T. 18 N., R. 12 W.	Indian Allotment	2
Bisti #1	T. 23 N., R. 12 W.	Public	20-30 (Historic Battlefield) c/
Bisti #6/8	T. 23 N., R. 12 W.	Indian Allotment	3
			SUBTOTAL 25-35
			TOTAL REPORTED GRAVES 36-46

Source: BLM, Albuquerque District, Farmington Resource Area Files

Notes: a/ This area probably contains additional gravesites that are not presently known to the BLM.
b/ Section and quarter section designations have been omitted from this table.
c/ This reported battlefield site may contain both Navajo and Ute graves. The number of graves has not been confirmed by the BLM (See USDI, BLM, 1981a for additional information about the site).

APPENDIX F-5
NAVAJO SACRED SITES IN THE EIS REGION a/

Lease Application No./Tract Name	Legal Description b/	Surface Ownership	No. and Site Type
PRLAs (All Surface Mineable)			
NM-8130	T. 20 N., R. 8 W.	2198	1 Offering Point
NM-3919	T. 22 N., R. 10 W.	Public	1 Offering Point
NM-3918	T. 22 N., R. 10 W.	Public	1 Offering Point
NM-3755	T. 22 N., R. 11 W.	Public	1 Offering Point
			SUBTOTAL 4
Competitive Tracts			
Surface Mineable			
Samson Lake #2	T. 15 N., R. 19 W.	(Boundaries Unknown)	1 Possible Offering Point
Bisti #1	T. 23 N., R. 12 W.	Private	1 Gathering Area
Bisti #4	T. 23 N., R. 12 W.	Public/2198	1 Gathering Area
Underground Mineable			
Star Lake East (LC)	T. 20 N., R. 5 W.	(Boundaries Unkown)	1 Sacred Area (type unknown)
			SUBTOTAL 4
			TOTAL REPORTED SACRED SITES 8

Source: BLM, Albuquerque District, Farmington Resource Area Files

Notes: a/ This area may contain additional sacred sites that are not presently known to the BLM. Ten to fifteen Navajo sacred sites have been estimated to occur on the PRLA Area (DOI, BLM, 1981).
b/ Section and quarter section designation have been omitted from this table.

APPENDIX G
AIR QUALITY

AIR QUALITY

APPENDIX C

APPENDIX G-1

AIR QUALITY ANALYSIS ASSUMPTIONS AND METHODOLOGY

Two studies were used in the air quality impact analysis for this EIS. The first study (Pedco 1982) was a conservative screening analysis to determine if a mine or pair of mines had the potential to exceed the applicable ambient air quality standard. Those mines that showed a potential were then analyzed in more depth using a computerized dispersion model CDMQC (ECOS 1982).

Predictions of future effects upon air quality of development projects were based on an atomospheric dispersion modeling analyses of pollutants emitted within and adjacent to the affected areas. Atmospheric dispersion models require two basic types of input data: meteorological data, and pollutant concentrations at specified receptor points around the source. Models are specifically designed to efficiently assess air quality in terms of averaging periods specified in regulatory standards for the affected region, which are appropriate to the environmental conditions. The ECOS study addresses regional effects of hypothesized future mines in the San Juan Basin. The pollutant of concern is TSP; and the modeling region was made sufficiently large to encompass all areas potentially harmed by emissions from proposed coal leasing.

Emissions

Emissions from three types of sources were quantified to determine the air quality of the EIS area: coal mining, both surface and underground; coal transportation (hauling and transferring); and major point sources in the study area.

The major pollutant emitted by the coal mines is particulate emissions of fugitive dust. The mines in the EIS area whose emissions were quantified consist of surface mines and underground mines. The proposed mines consist of a total of 20 surface mine units, five of which would have associated underground mines.

Only fugitive dust emissions were computed for the coal mining activities because particulate matter is the only pollutant which is generated in large enough quantities to have a significant impact on regional air quality.

Proposed and Existing Mine Leases

Emissions of particulate matter from proposed surface and underground mines were calculated directly from geologic and production data for tracts in the San Juan Basin. These data were developed by the Minerals Management Service (MMS) of the Department of the Interior. To complete the emissions calculations, ECOS developed mining scenarios and parameters through discussions with MMS and BLM specialists familiar with the San Juan Basin. A detailed discussion of these assumptions and the resulting emissions data can be found in the Technical Report (ECOS 1982).

The emissions data were then compared with emissions data derived by PEDCO (1982). In the present study, one mine was assumed per tract for calculating potential project emissions. The calculated emissions were somewhat larger than those derived by PEDCO. The present study used the highest emission factors approved by EPA or, where lacking, those in other published studies, while assuming the high level of Best Available Control Technology required by EPA Region VIII.

Emissions calculated for each of the one or more tracts available for development as a single mine under each alternative were then analyzed in order to construct the full production emissions level for that mine and alternative. Most mines in the various project alternatives involved a single tract; and the estimated tract emissions were used for that mine. The mines/alternatives based upon multiple tracts, each with an MMS-defined optimum production rate, were assumed to operate at the rate based upon the largest tract. An operator will develop the most productive tract first to maximize early returns on investment; and this will basically set the subsequent level of coal production when mining adjacent tracts. It was assumed that mines also involving existing federal and state leases will produce at the level set by the largest BLM-proposed tract. This assumption was forced by the lack of data (i.e. proprietary) on coal production from exising leases.

Calculations for one mine (#16) for the various alternatives was more complex. One alternative (No. 3) would involve only existing leases for this mine. To derive the level of production for this mine for this alternative, the average production rate from tracts in each alternative involving BLM tracts was calculated. The smallest average from the Mine 16 BLM alternative was then chosen. In essence, all available data were simply averaged for lack of better information. This procedure was also used to calculate emissions for the No-Project Alternative (No. 1).

Two mines (#18 and #20) involved only existing lease tracts for all alternatives. Thus, all alternatives for these mines would have the same emissions as Alternative 1. An analysis of BLM mine data suggested the plausibility of using BLM-based mine data for other mines situated on the closest tracts (i.e. Mines 17, 19 and 20) (personal communication, Mr. James Edwards, MMS, Farmington District). Thus, Mine 18 for each alternative was assigned an emissions level equal to the average of Alternative 1 emissions for Mines 17 and 19; and those for Mine 20 were set equal to Alternative 1 emissions for Mine 19. Table 3 lists resulting emissions for each mine and alternative. Total emissions for each alternative, irrespective of location of emission source, can be derived by summing the data in each column. These sums are listed as the last row in the table.

Mines in the study area were modeled as point sources. An average emissions height of five meters was assumed for all sources from the mines. This height was derived after considering the size of storage piles and the heights of emissions from trucks and loading devices, crushing and sorting machinery, road repair equipment, etc.

Dispersion Modeling Methodologies

For assessment of annual average impacts, the EPA-guideline Climatological Dispersion Model (CDMQC) was used to predict cumulative concentrations of TSP resulting from each coal leasing alternative, together with emissions from other sources in the San Juan Coal Region.

CDMQC predicts annual average pollutant concentrations based on the steady-state Gaussian dispersion formulation. A technical description of the CDMQC model is provided in the Technical Report (ECOS 1982). The model was designed for assessment of gaseous pollutants; therefore, it was modified to simulate particulate fallout due to gravitational settling. Another modification to the model was the incorporation of an algorithm to calculate annual geometric mean concentrations, since federal and state TSP ambient air quality standards (AAQS) and PSD increments are not specified in terms of arithmetic averages but in geometric means. The modified CDMQC model can also predict concentrations at all grid points of a specified modeling grid and at specific receptor points. The gridded output was processed by a contouring computer program to generate isopleth maps.

In addition to annual average AAQ and PSD increment standards, there are also corresponding 24-hour average standards for TSP. A statistical model developed by Larsen (1971) of the U.S. EPA was used to generate maximum worstcase 24-hour concentrations for receptor points where high annual arithmetic means occur. This statistical procedure is described in the Technical Report.

Modeling Area

Figure 1 shows the spatial extent of the modeling area. The grid origin is located approximately at 652.5 kilometers (km) East, 3874.7 km North, in the Universal Transverse Mercator (UTM) coordinate system for Zone 12. It covers an area of 225 km by 210 km and includes all major emissions sources in the San Juan Coal Region. The modeling grid employs a 5 km resolution in each direction, and contains 45 by 42 (1890) grid cells. For assessment of potential impacts at PSD Class I areas (Mesa Verde National Park and San Pedro Parks Wilderness), and the Chaco Canyon National Monument Class II area, specific receptor points were used in the modeling to predict cumulative increments.

Within the selected modeling grid, emissions from baseline sources and proposed coal mines for each alternative were assigned to proper grid loc-tions. For estimates of worst-case impacts, all emission sources were modeled as point sources.

Meteorological Inputs

The climatological dispersion model CDMQC requires the joint frequency of wind speed, wind direction and atmospheric stability as meteorological inputs. These data are in the form of the Stability Array (STAR) program available from the National Climatic Center. Within the selected modeling area, STAR data are available for the monitoring stations located at Farmington, Gallup and Grants. Since CDMQC can only accommodate a single STAR

deck, the STAR data obtained for these three stations were averaged for use in the modeling. The averaged STAR data were assumed to be representative of climatological dispersion conditions throughout the San Juan Coal Region, without consideration of subregional conditions.

Other meterological inputs required by the CDMQC model include the mean afternoon and nocturnal mixing heights. Values of 2000 meters (m) and 200 m were assigned to these mixing heights.

Background Concentrations

To evaluate the effects of project pollutant emissions, particularly in relation to federal state air quality standards, it is necessary to know the pre-existing, or background, TSP concentrations. A value of 30 ug/m^3 was assumed to represent the annual background. This value corresponds closely to the average annual concentration observed by the state monitoring station at Zuni for the years 1977-1980, and is believed to be the most representative background value available. It was also used in the earlier screening analysis for the proposed coal mines conducted by PEDCO Environmental Inc. (1982).

Modeling Accuracy and Limitations

The modeling studies show the potential worst-case adverse consequences of the project on air quality in terms sufficient to provide an understanding of the types of adverse effects to be expected, their geographical extent, their degrees of intensity, and their relationships to regulatory standards. This information can be used to aid in selection of a preferred alternative, and to anticipate the nature of its impacts. It can also be used as a guide to more detailed future evaluation of the selected alternative and of its specific implementation features.

It must be understood, however, that the modeling studies were limited by various constraints, and the conclusions are consequently subject to limitations which should be borne in mind by the reader.

Only worst-case situations were evaluated, because these are the most important in determining acceptable project limts. However, the worst-case results give no quantitative information on average impacts, or on best case situations, or on frequencies to be expected for worst, average, best, or any other circumstances.

Accuracy of modeling results obtained in this study is affected by a number of potential sources of error, including inaccuracies in modeling inputs and in the dispersion model itself. Particulate emission rates were generated by using mine design parameters estimated by the BLM, which may not be the actual values used by the mine developers. Emissions were also calculated based primarily on empirical emission factors developed for surface coal mines located in other western states (Wyoming, Colorado and Montana); hence, their applicability to coal mines in the San Juan Coal Region is assumed but has not been validated.

Accuracy of modeling results is also affected by the inherent limitations of the CDMQC model. The CDMQC model has not been thoroughly validated for air quality assessment of coal mine development. However, it is generally accepted that its predictions of annual average concentrations are accurate within a factor of two. Its predictions of 24-hour impacts may be less accurate, since they are based on a statistical relationship developed for urban areas. The statistical procedure also assumes that the modeled pollutant has a lognormal distribution for all averaging times. More realistic 24-hour impacts can only be predicted by using a short-term dispersion model and appropriate 24-hour metecrological scenarios. The CDMOC model was originally developed in an urban area and was not modified for use in a rural scenario.

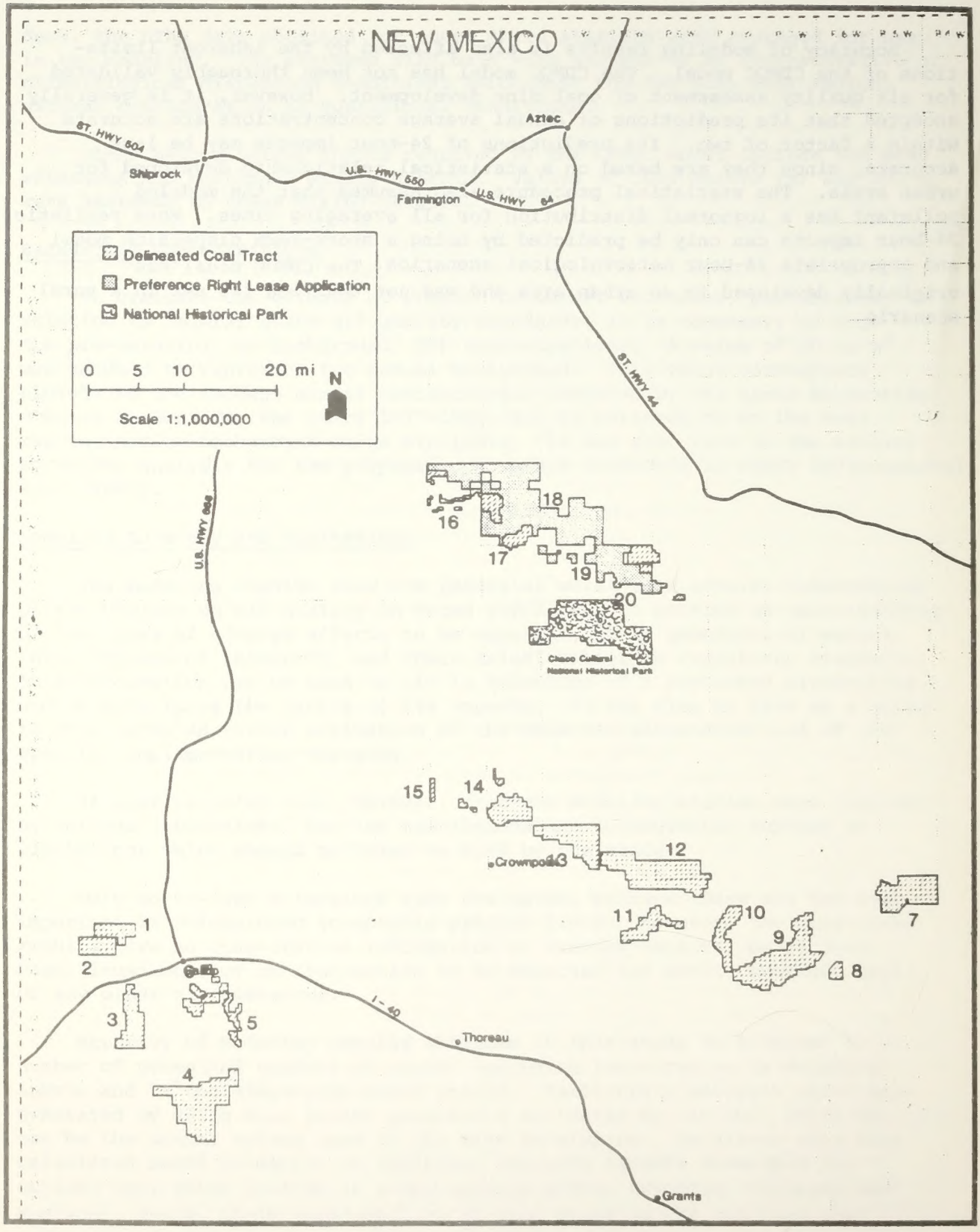


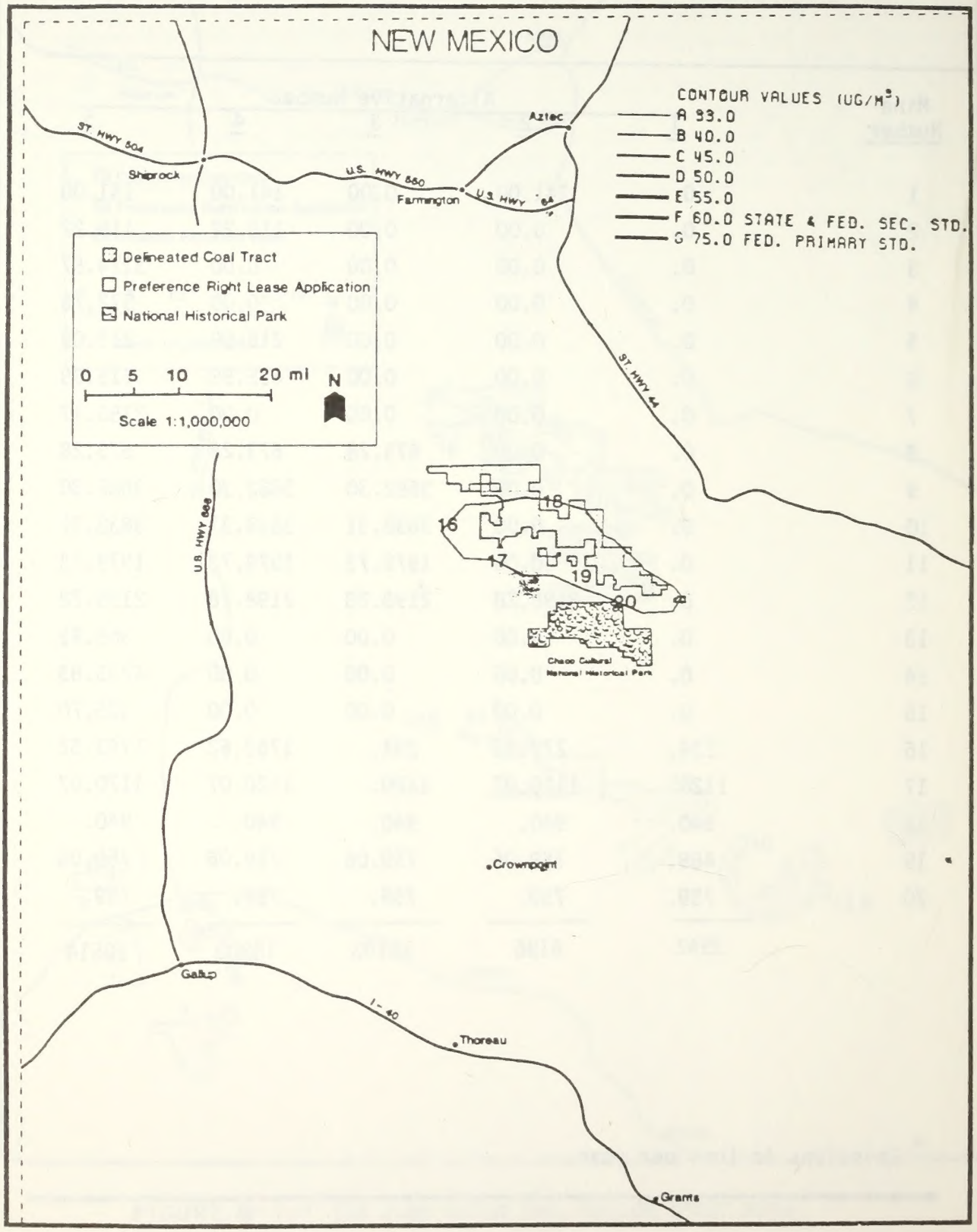
FIGURE G-1-1 SAN JUAN BASIN COAL REGION STUDY AREA

TABLE G-1-1

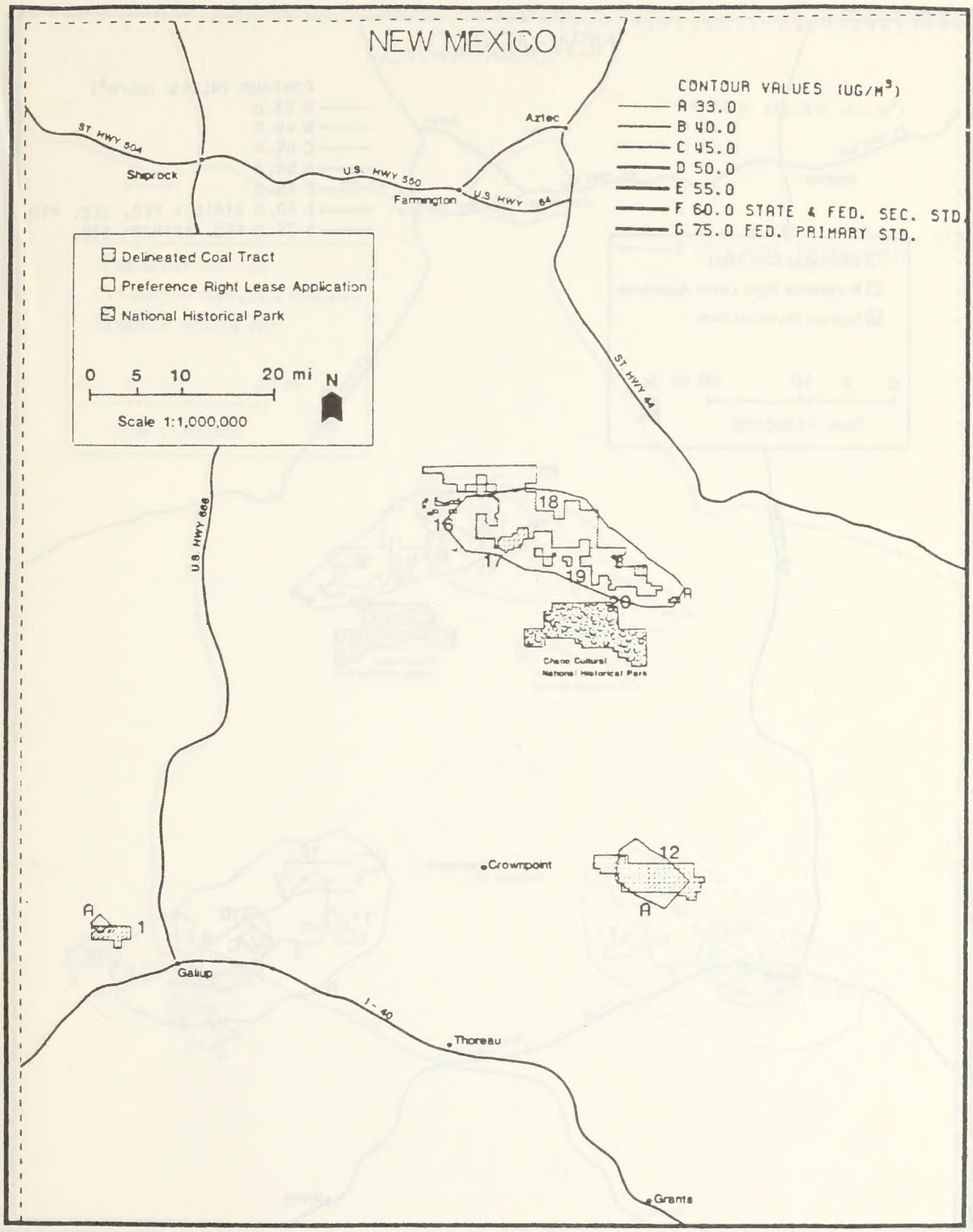
TSP EMISSIONS BY ALTERNATIVE*

Mine Number	Alternative Number				
	1	2	3	4	5
1	0.	141.00	0.00	141.00	141.00
2	0.	0.00	0.00	118.22	118.22
3	0.	0.00	0.00	0.00	3174.57
4	0.	0.00	0.00	0.00	372.15
5	0.	0.00	0.00	215.09	215.09
6	0.	0.00	0.00	615.99	615.99
7	0.	0.00	0.00	0.00	2753.17
8	0.	0.00	673.28	673.28	673.28
9	0.	0.00	3682.30	3682.30	3682.30
10	0.	0.00	3838.31	3838.31	3838.31
11	0.	0.00	1979.73	1979.73	1979.73
12	0.	2198.28	2198.28	2198.28	2198.28
13	0.	0.00	0.00	0.00	368.95
14	0.	0.00	0.00	0.00	4735.83
15	0.	0.00	0.00	0.00	305.70
16	234.	279.35	234.	1763.62	1763.62
17	1120.	1120.07	1120.	1120.07	1120.07
18	940.	940.	940.	940.	940.
19	489.	759.06	759.06	759.06	759.06
20	759.	759.	759.	759.	759.
	3542	6196	16183	18803	30514

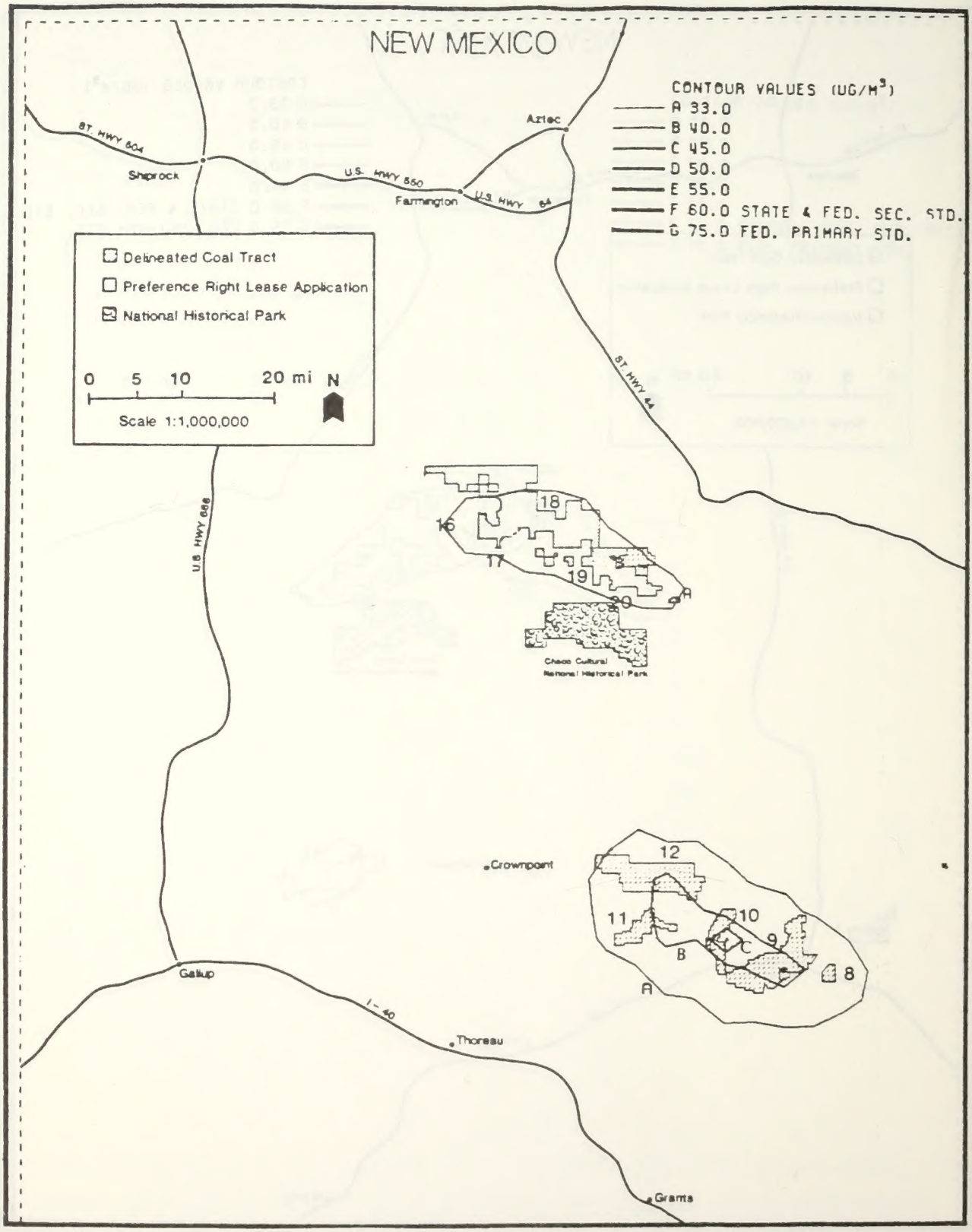
* Emissions in tons per year



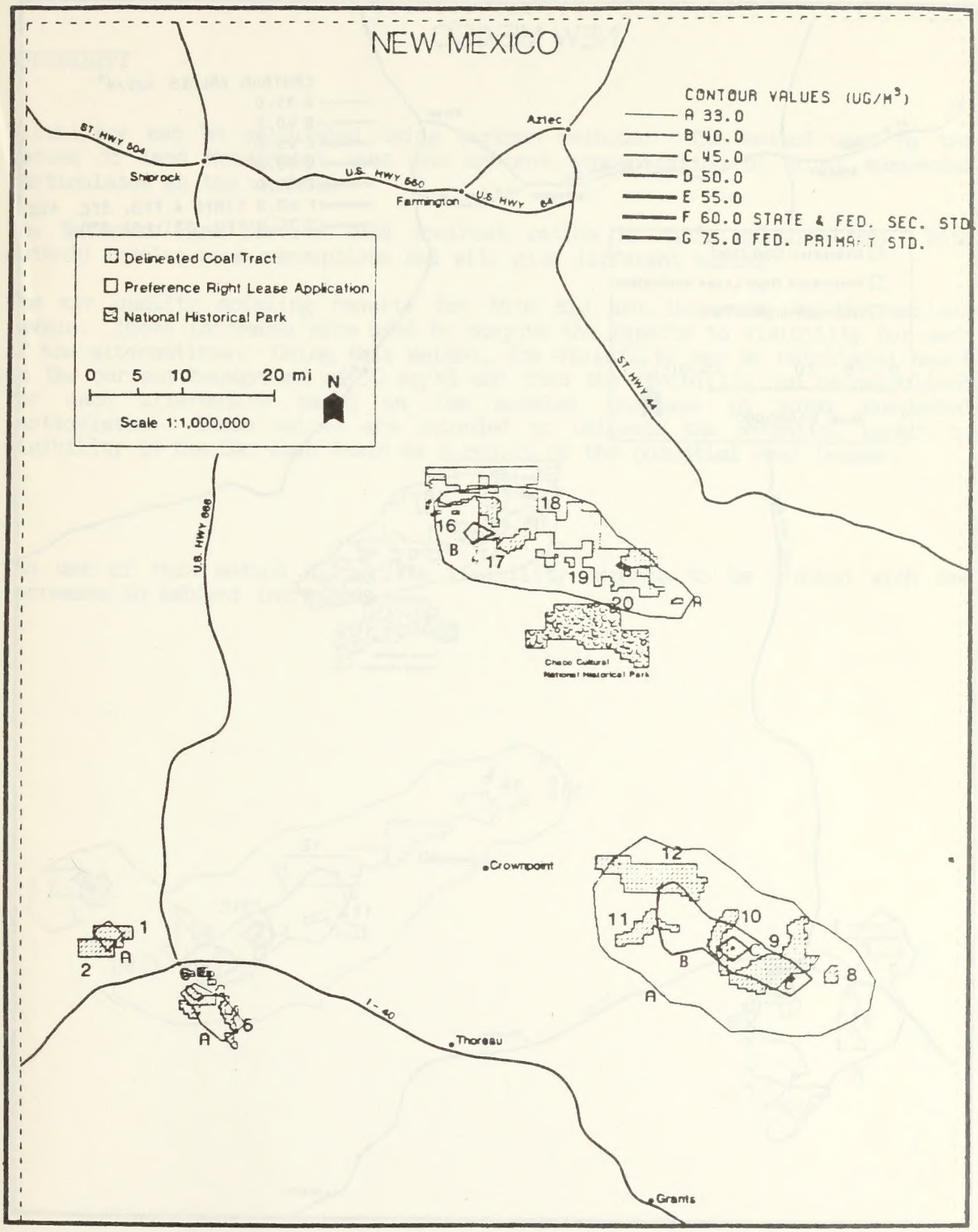
MAP G-1-1 ANNUAL AVERAGE AMBIENT TSP CONCENTRATION, NO ACTION ALTERNATIVE



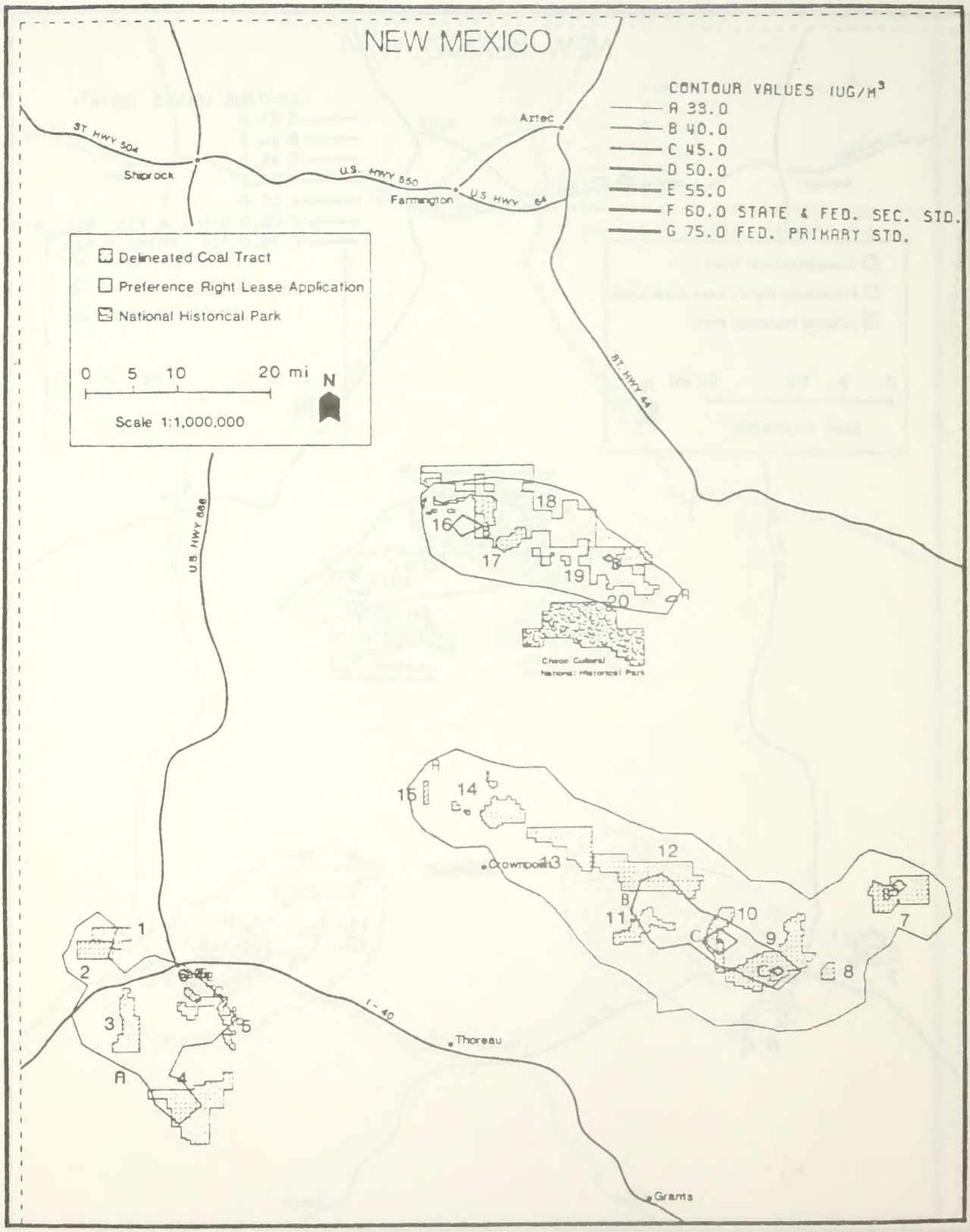
MAP G-1-2 ANNUAL AVERAGE AMBIENT TSP CONCENTRATION, BYPASS ALTERNATIVE



MAP G-1-3 ANNUAL AVERAGE AMBIENT TSP CONCENTRATION, MINIMUM SURFACE OWNER CONFLICT ALTERNATIVE



MAP G-1-4 ANNUAL AVERAGE AMBIENT TSP CONCENTRATION, TARGET ALTERNATIVE



MAP G-1-5 ANNUAL AVERAGE AMBIENT TSP CONCENTRATION, HIGH ALTERNATIVE

APPENDIX G-1

VISIBILITY

Visibility can be calculated using various methods. The method used by the Bureau of Land Management uses the ambient concentration of total suspended particulates as the variable.

The National Park Service used contrast ration in their calculations. Both methods involve some assumptions and will give different values.

The air quality modeling results for this EIS are increases to the ambient levels. These increases were used to compute the impacts to visibility for each of the alternatives. Using this method, the visibility can be calculated based on the current background of 30 mg/m3 and then the visibility can be calculated for each alternative based on the modeled increase in total suspended particulates. These values are intended to indicate the potential impact to visibility in the San Juan Basin as a result of the potential coal leases.

The use of this method allows the visibility impacts to be tracked with the increases in ambient increases.

APPENDIX H
SURFACE OWNER CONSULTATION LETTERS

APPENDIX H

SURFACE OWNER CONSULTATION RELATED

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

P.O. BOX 568
FARMINGTON, NEW MEXICO 87401

IN REPLY REFER TO
3120

CERTIFIED-RECEIPT REQUESTED

Dear Surface Owner:

The Bureau of Land Management has completed its land use planning for the area and is initiating actions necessary to consider issuing new competitive coal leases. These actions include tract delineation in conjunction with the U. S. Geological Survey, Site Specific Analysis and the San Juan River Regional Coal Environmental Impact Statement.

Our review of Federal and State records show that you own the surface over the following lands in which the United States has retained ownership of the mineral estate including the coal in and under the land:

You may meet qualifications under section 714 of the Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. 1304) to be classed as a "surface owner." We would be happy to meet with you to discuss these qualifications. If you qualify, this classification gives you certain types of protection. Under current law, the Department cannot issue a new competitive lease and authorize a company to surface mine federal coal under your land without your permission. The Department may be proposing to lease the coal under your land in the near future.

The purpose of this letter is to consult with you and to give you a chance to tell us whether you would favor or oppose leasing of coal under your land. To assist you in understanding this process, I would like to tell you what your views will do and what they will not do.

(1) If you are in favor of leasing, you are not bound by that decision and you may still, at a later date, withhold your permission to leasing and prevent the Department from issuing a lease for the coal in these lands. However, if you have already given your written consent for surface coal mining on your land you may have lost the right to withhold your consent at a later date.

(2) If you express a preference against the Department's issuing a lease for coal under your land, the Department may or may not eliminate that land from further consideration for development. If at a later date you change your mind and favor leasing, the Department may reconsider whether the coal under your land should be leased.

(3) Even if you are in favor of leasing, the Department is under no obligation to offer the coal under your land for lease. The Department may decide that the lands should not be offered because of environmental problems. It may decide that other lands contain better coal and should be developed before the coal under your land. It may also decide that there is no need to lease that coal because other lands are already available for mining. The general question whether new coal leasing is needed on a national basis is now being studied by the Department.

I, or a member of my staff, would be happy to talk with you if you have any questions about this letter. Please feel free to call us. Your response to this letter is an important part of the leasing process and I want you to understand it completely.

Sincerely yours,

Richard T. Watts
Acting Area Manager

Enclosure

IN REPLY REFER TO
3120

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

P.O. BOX 568
FARMINGTON, NEW MEXICO 87401

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You may meet qualifications under section 714 of the Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. 1304) to be classed as a "surface owner." We would be happy to meet with you to discuss these qualifications. If you qualify, this classification gives you certain types of protection. Under current law, the Department cannot issue a new competitive lease and authorize a company to surface mine federal coal under your land without your permission. The Department may be proposing to lease the coal under your land in the near future.

The purpose of this letter is to consult with you and to give you a chance to tell us whether you would favor or oppose leasing of coal under your land. To assist you in understanding this process, I would like to tell you what your views will do and what they will not do.

(1) If you are in favor of leasing, you are not bound by that decision and you may still, at a later date, withhold your permission to leasing and prevent the Department from issuing a lease for the coal in these lands. However, if you have already given your written consent for surface coal mining on your land you may have lost the right to withhold your consent at a later date.

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(3) Even if you are in favor of leasing, the Department is under no obligation to offer the coal under your land for lease. The Department may decide that the lands should not be offered because of environmental problems. It may decide that other lands contain better coal and should be developed before the coal under your land. It may also decide that there is no need to lease that question whether new coal leasing is needed on a national basis is now being studied by the Department.

It would be most helpful if you could return your response to this request on the attached form as soon as possible or within the next 30 days.

Our Navajo BLM personnel, Danny Charlie and Pauline McCauley are working with this consultation and you can contact them at 325-3581, Farmington Resource Area office.

Mrs. McCauley will be at the following location to explain this letter and answer any questions in reference to this letter.

Crownpoint BIA Conference Room, August 6, 1982, 8:00 a.m. to 3:00 p.m.

I, or a member of my staff, would be happy to talk with you if you have any questions about this letter. Please feel free to call us. Your response to this letter is an important part of the leasing process and I want you to understand it completely. We have enclosed a brochure on the rights of surface owners over Federal coal for your information.

Sincerely yours,

Richard T. Watts
Acting Area Manager

Enclosure

APPENDIX I

STANDARD COAL LEASE FORM
ADDITIONAL SPECIAL STIPULATIONS

APPENDIX I

ADDITIONAL SPECIAL STUDY AREAS
STANDARD COST REVIEW FORM

APPENDIX I-1

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Serial Number

COAL LEASE

This lease, is entered into on by the United States of America, the lessor through the Bureau of Land Management, and

the lessee,

and shall become effective on

(effective date).

Sec. 1. STATUTES AND REGULATIONS — This lease is issued pursuant and subject to the terms and provisions of the Mineral Leasing Act of February 25, 1920, 41 Stat. 437, as amended, 30 U.S.C. Sections 181-287 and 90 Stat. 1083-1092, hereafter referred to as the Act, and of the Surface Mining Control and Reclamation Act of 1977, 30 U.S.C. Section 1201 et seq., and the Mineral Leasing Act for Acquired Lands of August 7, 1947, as amended, 30 U.S.C. 351-359 et seq. This lease is subject to all regulations of the Secretary of the Interior (including but not limited to 30 CFR Part 211 and Chapter VII and 43 CFR Group 3400) which are now in force or (except as expressly limited herein) hereafter in force, and all such regulations are made a part hereof.

WITNESSETH:

Sec. 2. RIGHTS OF LESSEE — The lessor, in consideration of any bonus paid (or to be paid if deferred), rents and royalties and other conditions hereinafter set forth, hereby grants and leases to the lessee the exclusive right and privilege to mine and dispose of

containing acres, more or less and, subject to the conditions, limitations and prohibitions provided in this lease and in applicable acts and regulations, the right to construct all works, buildings, structures, equipment, and appliances which may be necessary and convenient for the mining and preparation of the coal for market, and, subject to the conditions herein provided, to use so much of the surface as may reasonably be required in the exercise of the rights and privileges herein granted for a period of 20 years and so long thereafter as the condition of continued operation is met.

Sec. 3. DILIGENT DEVELOPMENT AND CONTINUED OPERATION — The lessee shall engage in the diligent development of the coal resources subject to the lease. After diligent development is achieved, the lessee shall maintain continued operation of the mine or mines on the leased lands. The terms diligent development and continued operation are defined in the applicable regulations in Titles 30 and 43 of the Code of Federal Regulations.

Sec. 4. BONDS — The lessee shall file with the appropriate Bureau of Land Management office a lease bond in the amount of for the use and benefit of the United States, to insure payment of deferred bonus payments, rentals and royalties and to insure compliance with all other terms of this lease, the regulations and the Act (except for reclamation within the area covered by a surface mining permit issued under the permanent regulatory program by the regulatory authority) and, if appropriate, for the protection of the interests of the surface owners on the leased lands. An increase in the amount of the lease bond may be required by the lessor at any time during the life of the lease to reflect changed conditions.

Sec. 5. RENTAL — An annual rental of for each acre or fraction thereof shall be paid in advance on or before each anniversary date of this lease. This section shall not be subject to revision except in the course of lease readjustment.

Sec. 6. PRODUCTION ROYALTY — The lessee shall pay a production royalty of percent of the value of coal produced by strip or auger methods and percent of the value of coal produced by underground mining methods. The value of coal shall be determined as set forth in 30 CFR 211. Production royalties paid for a calendar month shall be reduced by the amount of any advance royalties paid under this lease to the extent that such advance royalties have not been used to reduce production royalties in a previous month. However, production royalties payable after the 20th year of the lease shall not be reduced by advance royalties paid during the first 20 years of the lease. Production royalties shall be payable the final day of the month succeeding the calendar month in which the coal is sold, unless otherwise specified in 30 CFR 211. The royalty rates provided in this section shall not be subject to revision except in the course of lease readjustment.

Sec. 7. ADVANCE ROYALTY — Upon request by the lessee the District Mining Supervisor may accept, for a total of not more than 10 years, the payment of advance royalties in lieu of continued operation consistent with the regulations in 43 CFR 3473 and 30 CFR 211. The advance royalty shall be based on a percent of the value of a minimum number of tons which shall be determined in the manner established by the regulations in 30 CFR 211.

Sec. 8. METHOD OF PAYMENTS — The lessee shall make rental payments to the appropriate Bureau of Land Management office until production royalties become payable. Thereafter, all rentals, production royalties and advance royalties shall be paid to the appropriate office of the United States Minerals Management Service.

exploration plan. Exploration plans for leased lands covered by an approved mining permit shall be submitted to the Regional Director of the Office of Surface Mining in accordance with the regulations in 30 CFR Chapter VII. Exploration plans for leased lands not covered by an approved mining permit shall be submitted to the District Mining Supervisor in accordance with the regulations in 30 CFR 211.

Sec. 10. MINING PLAN — In accordance with the regulations in 30 CFR 211 and Chapter VII, the lessee shall submit a mining and reclamation plan not more than three years after the effective date of this lease. Mining operations shall not commence until after the mining and reclamation plan is approved. The mining and reclamation shall be conducted in accordance with the approved mining and reclamation plan. Exploration activities which were not included in the approved mining and reclamation plan require submittal of exploration plans in accordance with Section 9 of this lease.

Sec. 11. LOGICAL MINING UNIT (LMU) — This lease is automatically considered to be an LMU. This LMU may be enlarged, adjusted or diminished in accordance with the applicable regulations in Titles 10, 30, and 43 of the Code of Federal Regulations. The mining plan for the LMU shall require that the reserves of the LMU will be mined within a period of 40 years in accordance with 30 CFR 211 and 43 CFR 3400.0-5. The definition of LMU and LMU reserves and other applicable conditions are set forth in the regulations in 43 CFR 3400.0-5 and 3475, 30 CFR 211, and Title 10 of the Code of Federal Regulations.

Sec. 12. OPERATIONS ON LEASED LANDS — (a) In accordance with conditions of this lease, the exploration and mining and reclamation plans, the permit issued pursuant to 30 CFR Chapter VII, and all applicable acts and regulations, the lessee shall exercise reasonable diligence, skill, and care in all operations on leased lands. (b) The lessee shall minimize to the maximum extent possible wasting of the coal deposits and other mineral and nonmineral resources, including, but not limited to, surface resources which may be found in, upon, or under such lands.

Sec. 13. SPECIAL STATUTES — The lessee shall comply with the provisions of the Federal Water Pollution Control Act (33 U.S.C. 1151-1175) and the Clean Air Act (42 U.S.C. 7401 et seq.).

Sec. 14. AUTHORIZATION OF OTHER USES AND DISPOSTION OF LEASED LANDS — (a) The lessor reserves the right to authorize other uses of the leased lands by regulation or by issuing, in addition to this lease, leases, licenses, permits, easements, or rights-of-way, including leases for the development of minerals other than coal under the Act. The lessor may authorize any other uses of the leased lands that do not unreasonably interfere with the exploration and mining operations of the lessee, and the lessee shall make all reasonable efforts to avoid interference with such authorized uses.

(b) The lessor reserves the right: (i) to sell or otherwise dispose of the surface of the leased lands under existing law or laws hereafter enacted insofar as said surface is not necessary for the use of the lessee in the extraction and removal of the coal therein, or (ii) to dispose of any resource in such lands if such disposal will not unreasonably interfere with the exploration and mining operations of the lessee.

(c) If the leased lands have been or shall hereafter be disposed of under laws reserving to the United States the deposits of coal therein, the lessee shall comply with all conditions as are or may hereafter be provided by the laws and regulations reserving such coal.

Sec. 15. EQUAL OPPORTUNITY CLAUSE — The lessee will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended, and the rules, regulations and relevant orders of the Secretary of Labor.

Sec. 16. CERTIFICATION OF NONSEGREGATED FACILITIES - By entering into this lease, the lessee certifies that he does not and will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not and will not permit his employees to perform their services at any location under his control where segregated facilities are maintained. The lessee agrees that a breach of this certification is a violation of the Equal Opportunity clause of this lease. As used in this certification, the term "segregated facilities" means, but is not limited to, any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, because of habit, local custom, or otherwise. Lessee further agrees that (except where lessee has obtained identical certifications from proposed contractors and subcontractors for specific time periods) lessee will obtain identical certifications from proposed contractors and subcontractors prior to award of contracts or subcontracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause; that lessee will retain such certifications in lessee's files; and that lessee will forward the following notice to such proposed contractors and subcontractors (except where proposed contractor or subcontractor has submitted identical certifications for specific time periods). Notice to prospective contractors and subcontractors of requirement for certification of nonsegregated facilities. A *Certification of Nonsegregated Facilities*, as required by the May 9, 1967, order (32 F.R. 7439, May 19, 1967) on *Elimination of Segregated Facilities*, by the Secretary of Labor, must be submitted prior to the award of a contract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity clause. Certification may be submitted either for each contract and subcontract or for all contracts and subcontracts during a period (i.e., quarterly, semiannually, or annually).

Sec. 17. EMPLOYMENT PRACTICES — The lessee shall pay all wages due persons employed on the leased lands at least twice each month in lawful money of the United States. The lessee shall grant all miners and other employees complete freedom to purchase goods and service of their own choice. The lessee shall restrict the workday to not more than 8 hours in any one day for underground workers, except in case of emergency. The lessee shall employ no person under the age of 16 years in any mine below the surface. If the laws of the State in which the mine is situated prohibit the employment, in a mine below the surface, of persons of an age greater than 16 years, the lessee shall comply with those laws.

Sec. 18. MONOPOLY AND FAIR PRACTICES — The lessor reserves full authority to promulgate and enforce orders and regulations under the provisions of Sections 30 and 32 of the Act (30 U.S.C. Sections 187 and 189) necessary to insure that any sale of the production from the leased lands to the United States or to the public is at reasonable prices, to prevent monopoly, and to safeguard the public welfare, and such orders and regulations shall upon promulgation be binding upon the lessee.

Sec. 19. TRANSFERS —

☐ This lease may be transferred in whole or in part to any person, association or corporation qualified under 43 CFR 3472.1-1 to hold a lease.

☐ This lease may only be transferred in whole or in part to another public body, or to a person who will mine the coal on behalf of and for the use of the public body, or to a person for the limited purpose of creating a security interest in favor of a lender who agrees to be obligated to mine the coal on behalf of the public body. The transferee must be qualified under 43 CFR 3472.

☐ This lease may only be transferred in whole or in part to other small businesses qualifying under 13 CFR 121 and 43 CFR 3472.2-2(c).

Any transfer of this lease in whole or in part is subject to the procedures and requirements for approval in the relevant regulations in 43 CFR 3400. A transfer will become effective on the first day of the month following its approval by the authorized officer, or, if the transferee requests, the first day of the month of the approval.

Sec. 20. RELINQUISHMENT OF LEASE — The lessee may file a relinquishment of the entire lease, a legal subdivision or aliquot part thereof, but not less than 10 acres, or any bed of the coal deposits therein. The relinquishment shall be filed in triplicate with the authorized officer. Upon the determination by the authorized officer that the public interest shall not be impaired, that all accrued rentals and royalties have been paid and that all of the obligations of the lessee under the regulations and the lease terms have been met, the relinquishment shall be accepted effective the date filed.

Sec. 21. NONCOMPLIANCE — Any failure to comply with the conditions of this lease, the approved exploration and mining and reclamation plans, the regulations, or applicable acts shall be dealt with in accordance with the procedures set forth in the regulations.

Sec. 22. WAIVER OF CONDITIONS — The lessor reserves the right to waive any breach of the conditions contained in this lease, except the breach of such conditions as are required by the Act, but any such waiver shall extend only to the particular breach so waived and shall not limit the rights of the lessor with respect to any future breach; nor shall the waiver of a particular breach prevent cancellation of this lease for any other cause, or for the same cause occurring at another time.

Sec. 23. READJUSTMENT OF TERMS AND CONDITIONS — (a) The lease is subject to readjustment on the 20th year after the effective date and on each 10th year thereafter. In order that the lease may be readjusted as close as possible to the dates when it becomes subject to readjustment, the lessor may propose the terms of readjustment of any conditions of this lease, including rental and royalty rates, before the 20th year after the effective date and before each 10-year interval thereafter. The authorized officer shall notify the lessee whether he intends to readjust the terms and conditions of the lease and, if he intends to readjust, the nature of the readjustments in accordance with the regulations in 43 CFR 3451. Unless the lessee, within 60 days after receipt of the proposed readjusted terms, files with the lessor an objection to the proposed readjusted conditions or relinquishes the lease as of the effective date of the readjustment, the lessee shall be deemed conclusively to have agreed to such conditions.

(b) If the lessee files objections to the proposed readjusted conditions, the existing conditions shall remain in effect until there has been an agreement between the lessor and the lessee on the new conditions to be incorporated in the lease, or until the lessee has exhausted his rights of appeal under Section 31 of this lease, or until the lease is relinquished, except that the authorized officer may provide in the notice of readjusted lease terms that the readjustment or any part thereof is effective pending the outcome of the appeal. If the readjusted royalty provisions are subsequently rescinded or amended, the lessee shall be permitted to credit any excess royalty payments against royalties subsequently due to the lessor.

Sec. 24. DELIVERY OF PREMISES — Upon termination of this lease for any reason, or relinquishment of a part of this lease, the lessee shall deliver to the lessor in good order and condition all or the appropriate part

Sec. 24. DELIVERY OF PREMISES — Upon termination of this lease for any reason, or relinquishment of a part of this lease, the lessee shall deliver to the lessor in good order and condition all or the appropriate part of the leased lands. Delivery of the leased lands shall include underground timbering and such other supports and structures as are necessary for the preservation of the mine or deposit, and shall be in accordance with all other applicable provisions of the regulations including 30 CFR 211 and Chapter VII, for the completion of operations and abandonment.

Sec. 25. PROPRIETARY INFORMATION — Geological and geophysical data and information, including maps, trade secrets, and commercial and financial information which the lessor obtains from the lessee shall be treated in accordance with 43 CFR Part 2, 30 CFR 211.6 and other applicable regulations. Total lease reserve figures developed from this information will not be confidential.

Sec. 26. LESSEE'S LIABILITY TO LESSOR — (a) The lessee shall be liable to the United States for any damage suffered by the United States in any way arising from or connected with the lessee's activities and operations under this lease, except where damage is caused by employees of the United States acting within the scope of their authority.

(b) The lessee shall indemnify and hold harmless the United States from any and all claims arising from or connected with the lessee's activities and operations under this lease.

(c) In any case where liability without fault is imposed on the lessee pursuant to this section, and the damages involved were caused by the action of a third party, the rules of subrogation shall apply in accordance with the law of the jurisdiction where the damages occurred.

Sec. 27. INSPECTIONS AND INVESTIGATIONS — (a) All books and records maintained by the lessee showing information required by this lease or regulations must be kept current and in such manner that the books and records can be readily checked at the mine, upon request, by the Regional Director or District Mining Supervisor or their representative.

(b) The lessee shall permit any duly authorized officer or representative of the lessor at any reasonable time (1) to inspect or investigate the leased lands, the exploration and mining and reclamation operations, and all surface and underground improvements, works, machinery, and equipment, and all books and records pertaining to the lessee's obligations to the lessor under this lease and regulations and (2) to copy, and make extracts from any such books and records.

Sec. 28. UNLAWFUL INTEREST — No member of, or Delegate to, Congress, or Resident Commissioner, after his election or appointment, either before or after he has qualified and during his continuance in office, and no officer, or employee of the Department of the Interior, except as provided in 43 CFR 7.4(a)(3), shall hold any share or part in this lease or derive any benefit therefrom. The provisions of Section 3741 of the Revised Statutes, as amended, 41 U.S.C. Section 22, and the Act of June 25, 1948, 62 Stat. 702, as amended, 18 U.S.C. Sections 431-433, relating to contracts, enter into and form a part of this lease insofar as they may be applicable.

Sec. 29. APPEALS — The lessee shall have the right of appeal (a) under 43 CFR 3000.4 from an action or decision of any official of the Bureau of Land Management, (b) under 30 CFR Part 290 from an action, order, or decision of any official of the Minerals Management Service, or (c) under applicable regulation from any action or decision of any other official of the Department of the Interior arising in connection with this lease, including any action or decision pursuant to Section 23 of this lease with respect to the readjustment of conditions.

Sec. 30. DEFERRED BONUS — This lease is issued subject to the payment of by the lessee as a deferred bonus. Payment of the deferred bonus by the lessee shall be made on a schedule specified in Section 31 (Special Stipulations) of this lease.

Sec. 31. SPECIAL STIPULATIONS — (a) Cultural Resources - (1) Before undertaking any activities that may disturb the surface of the leased lands, the lessee shall conduct a cultural resource intensive field inventory in a manner specified by the authorized officer of the BLM or of the surface managing agency (if different) on portions of the mine plan area and adjacent areas, or exploration plan area, that may be adversely affected by lease-related activites and which were not previously inventoried at such a level of intensity. The inventory shall be conducted by a qualified professional cultural resource specialist (i.e., archeologist, historian or historical architect, as appropriate), approved by the authorized officer of the surface managing agency (BLM if the surface is privately owned), and a report of the inventory and recommendations for protecting any cultural resources identified shall be submitted to the Regional Director of the Office of Surface Mining (or the District Mining Supervisor if activities are associated with coal exploration outside an approved mining permit area) and the authorized officer of the BLM or the surface managing agency (if different). The lessee shall undertake measures, in accordance with instructions from the Regional Director (or the District Mining Supervisor if activities are associated with coal exploration outside an approved mining permit area), to protect cultural resources on the leased land. The lessee shall not commence the surface disturbing activities until permission to proceed is given by the Regional Director (or the District Mining Supervisor if activities are associated with coal exploration outside an approved mining permit area).

(2) The lessee shall protect all cultural resource properties within the lease area from lease-related activities until the cultural resource mitigation measures can be implemented as part of an approved mining and reclamation plan or exploration plan.

(3) The cost of conducting the inventory, preparing reports, and carrying out mitigation measures shall be borne by the lessee.

(4) If cultural resources are discovered during operations under this lease, the lessee shall immediately bring them to the attention of the Regional Director (or the District Mining Supervisor if activities are associated with coal exploration outside an approved mining permit area), or the authorized officer of the surface managing agency if the Regional Director, or District Mining Supervisor, as appropriate, is not available. The lessee shall not disturb such resources except as may be subsequently authorized by the Regional Director (or the District Mining Supervisor if activities are associated with coal exploration outside an approved mining permit area). Within two (2) working days of notification, the Regional Director (or the District Mining Supervisor if activities are associated with coal exploration outside an approved mining permit area) will evaluate or have evaluated any cultural resources discovered and will determine if any action may be required to protect or preserve such discoveries. The cost of data recovery for cultural resources discovered during lease operations shall be borne by the surface managing agency unless otherwise specified by the authorized officer of the BLM or of the surface managing agency (if different).

(5) All cultural resources shall remain under the jurisdiction of the United States until ownership is determined under applicable law.

(b) Paleontological Resources - (1) Before undertaking any activities that may disturb the surface of the leased lands, the lessee shall contact the Bureau of Land Management to determine whether the authorized officer will require the lessee to conduct a paleontological appraisal of the mine plan and adjacent areas, or exploration plan areas, that may be adversely affected by lease-related activities. If the authorized officer determines that one is necessary, the paleontological appraisal shall be conducted by a qualified paleontologist approved by the authorized officer of the surface managing agency (BLM if the surface is privately owned), using the published literature and, where appropriate, field appraisals for determining the possible existence of larger and more conspicuous fossils of scientific significance. A report of the appraisal and recommendations for protecting any larger and more conspicuous fossils of significant scientific interest on the leased lands so identified shall be submitted to the authorized officer of the surface managing agency (BLM if the surface is privately owned). When necessary to protect and collect the larger and more conspicuous fossils of significant scientific interest on the leased lands, the lessee shall undertake the measures provided in the approval of the mining and reclamation plan or exploration plan.

(2) The lessee shall not knowingly disturb, alter, destroy or take any larger and more conspicuous fossils of significant scientific interest, and shall protect all such fossils in conformance with the measures included in the approval of the mining and reclamation plan or exploration plan.

(3) The lessee shall immediately bring any such fossils that might be altered or destroyed by his operation to the attention of the Regional Director or the District Mining Supervisor, as appropriate. Operations may continue as long as the fossil specimen or specimens would not be seriously damaged or destroyed by the activity. The Regional Director or the District Mining Supervisor, as appropriate, shall evaluate or have evaluated such discoveries brought to his attention and, within five (5) working days, shall notify the lessee what action shall be taken with respect to such discoveries.

(4) All such fossils of significant scientific interest shall remain under the jurisdiction of the United States until ownership is determined under applicable law. Copies of all paleontological resource data generated as a result of the lease term requirements will be provided to the Regional Director or the District Mining Supervisor, as appropriate.

(5) The cost of any required salvage of such fossils shall be borne by the United States.

(6) These conditions apply to all such fossils of significant scientific interest discovered within the lease area whether discovered in the overburden, interburden, or coal seam or seams.

c) Deferred Bonus Payment Schedule:

Sec. 31. Special Stipulations (continued)

THE UNITED STATES OF AMERICA

By _____
(Signing Officer)

_____
(Title)

_____
(Date)

WITNESS TO SIGNATURE OF LESSEE

_____ _____
(Signature of Lessee)

_____ _____
(Signature of Lessee)

_____ _____

APPENDIX I-2

SECTION 31(c). ADDITIONAL SPECIAL STIPULATIONS

The following stipulations are applicable only to the PRLAs listed after each stipulation.

The lease contains the rights-of-way shown in the attached decision. These rights-of-way shall be located when needed to allow coal mining operations. For those right-of-way grants which contains terms or conditions allowing the right-of-way to be modified, the right-of-way grantee shall pay all reasonable costs associated with relocation. For other right-of-way grants, the coal lessee shall pay all reasonable cost associated with the relocation.

[NM-585, 3918, 3919, 3754, 3755, 6801, 6802, 6804, 8130, 8715, 11670]

All right-of-way provisions and processing on Indian allotted and withdrawn Federal lands administered by the BIA will be subject to 25 CFR 161.

[All PRLAs]

The lease contains part of the approved right-of-way for the planned rail line of the Star Lake Railroad Company. The map in the attached decision shows the location of this right-of-way. The Star Lake Railroad right-of-way was granted for the purpose of transporting coal. Lands within the right-of-way are unsuitable for surface coal mining operations unless the lessee receives written permission from the right-of-way grantee and concurrence from the BLM allowing surface coal mining.

[NM-3752, 3754]

The lease contains the authorized occupied dwellings shown in the attached decision. An area within 300 feet of each of these dwellings is unsuitable for surface coal mining operations unless the lessee receives written permission from the owner allowing surface coal mining operations.

[NM-585, 8128, 8130, 8717, 6801]

The lease contains the unauthorized occupied dwellings shown in the attached decision. Unless otherwise agreed to by the residents, the lessee will relocate the residents of these dwellings in accordance with the following stipulations:

1. Residents and grazing areas shall be relocated within the individual Navajos' current Navajo Chapter.

2. Relocation details shall be worked out with the resident.

3. Relocations shall be staggered so that they do not all occur at the same time.

4. Families shall be relocated as a unit and not be split up.

5. The new location should have sufficient water and forage to accommodate displaced flocks or herds.

[NM-585, 3918, 8128, 8130, 8715]

The lessee shall conduct a detailed survey for gravesites on areas that will be disturbed by surface coal mining. The BLM shall approve the survey. Surveys for gravesites on Indian allotted and withdrawn Federal lands administered by the BIA will be approved by the BIA. The survey shall be completed before the lessee applies for a permit under the Surface Mining Control and Reclamation Act. An area 100 feet surrounding each gravesite which may be disclosed by the survey shall be considered unsuitable for surface coal mining unless the lessee lawfully relocated the gravesite(s).

[All PRLAs]

A gravesite(s) has been located on the lease as shown in the attached decision. Unless the lessee lawfully relocates the gravesite(s), an area 100 feet surrounding the gravesite(s) is unsuitable for surface coal mining.

[NM-3836, 6803]

The area within 100 feet of a road(s) as shown in the attached decision is unsuitable for surface coal mining unless the road is relocated as allowed by the Surface Mining Control and Reclamation Act.

[NM-585, 3752, 3753, 3754, 3755, 3835, 3836, 3837, 3918, 3919, 6801, 6803, 6804, 8128, 8130, 11670]

As shown on the enclosed map in the attached decision portions of the lease are within a Wilderness Study Area and are unsuitable for surface coal mining operations while the Wilderness Study Area is under review by the Administration and the Congress. The De-na-zin WSA is suitable for underground coal mining with no surface occupancies or subsidence.

[NM-3834, 3838, 11916]

The lease contains identified sites, buildings, structures and objects of historic, archeological, and cultural significance on Federal lands which are included in or eligible for inclusion in the National Register of Historic Places. Surface coal mining operations on the identified sites will be allowed after the lessee carries out measures to avoid adverse effects to the sites in accordance with the plan approved by the Office of Surface Mining in consultation with the BLM or BIA (depending which is the surface managing agency) and State Historic Preservation Officer. The exact location and information on sites available to date are available from the Farmington Resource Area Archeologist of the Bureau of Land Management.

[NM-585, 3752, 3754, 3755, 3835, 3836, 3837, 3918, 3919, 6803, 8128, 8130, 8745]

The lease contains an active golden eagle nest as shown in the attached decision. The nest and buffer zone as shown in the attached decision are unsuitable for surface coal mining operations unless the BLM and the Fish and Wildlife Service concur that surface coal mining will not disturb the eagles during the breeding season or unless the BLM with the concurrence from the Fish and Wildlife Service determines that the nest will be moved.

The lease contains an active prairie falcon nest and a buffer zone as shown in the attached decision. This area is unsuitable for surface coal mining operations unless the BLM and the Fish and Wildlife Service concur that surface mining will not disturb the falcons during the breeding season.

[NM-3834]

The lease contains high priority habitat for migrating birds of high Federal interest (Ferruginous hawk nest sites and buffer zones) as shown in the attached decision. This area is unsuitable for surface coal mining operations unless the BLM and the Fish and Wildlife Service concur that surface coal mining will not disturb the birds during the breeding season.

[NM-3919, 3753, 3834, 3835, 11916]

The lease contains areas within the 100-year recurrence interval floodplains as shown on Federal Insurance Administration flood maps on file at the BLM Albuquerque District and in the attached decision. The surface management agency in consultation with the Minerals Managment Service shall review the mining plan to be submitted by the lessee and specify any specific measures needed to ensure that mining will not cause a substantial threat of loss to people or property.

[NM-585, 3753, 3755, 3834, 3835, 3836, 3837, 3838, 3918, 3919, 6801, 6803, 6804, 8128, 8129, 8715, 8745, 9764, 11670]

The lessee shall protect the physical and legal availability of existing water sources in the lease application area. Any water removed or contaminated due to coal mining opertions shall be replaced by the lessee. Although replacement water needed not be identical to the original water source, it shall be of equal quality and quantity or better.

[All PRLAs]

The lessee shall transfer any water wells drilled on BLM or BIA administered surface in the lease to the surface management agency upon expiration, termination, cancellation or relinquishment of the lease.

[All PRLAs]

The lessee shall return all lands affected by coal mining operations to the Visual Resource Management class or better which existed prior to mining. Surface structures associated with coal mining operations shall be painted a color that is similar to colors commonly found in the surrounding landscape, except where other colors are needed to meet safety requirements.

[All PRLAs]

Coal mining operations in the lease on lands within Known Geologic Structures of producing oil and gas fields shall not interfere with the economic recovery of oil and gas, except as determined by the Mineral Management Service.

[All PRLAs]

The portion of the lease as shown in the attached decision overlaps the Navajo Indian Irrigation Project. The lessee shall not conduct coal mining opertions on this overlapping area until consultations between the lessee, NIIP, Minerals Management Service and BLM indicate that coal mining operations will not interfere with active intensive agriculture, as determined by the BIA's authorized officer in consultation with BLM.

[NM-6801, 11916]

At least 180 days prior to conducting coal mining operations in any section of land in the lease, the lessee shall notify the Navajo Nation, the Navajo Medicineman's Association, and the Navajo Chapter in which the lands are located of the scheduled coal mining activities. The lessee shall identify in the notification an individual from whom additional information can be obtained, if necessary. The purposes of this notification are to: 1) facilitate coordination through timely communication; 2) provide an opportunity for Navajo religious practitioners to conduct mitigatory actions for sacred and sensitive sites which are located in the area to be disturbed by coal mining. These actions may include the following: removal of sacred objects; selection of alternative locations for ritual activities; performance of appropriate ceremonies.

[All PRLAs]

The lessee shall conduct coal mining operations on the lands shown in the attached decision in a manner which minimizes adverse impacts to the recreational, scenic and scientific values recognized in the proposed Bisti/De-na-zin Area of Critical Environmental Concern, as determined by the authorized officer of the BLM after consultation with the Minerals Management Service.

[NM-3834, 3838, 6801, 11916]

The lessee shall not conduct coal mining operations on lands shown in the attached decision until the BLM has received from the lessee a completed study on the excavation and extraction of the paleontological resources found on thse lands or until September 21, 1991, whichever comes first, as determined by the BLM's authorized officer. Exploration may be allowed during this period at the discretion of the Minerals Management Service with concurrence from the BLM.

[NM-3752, 3753, 3835]

A portion of the lease shown in the attached decision contains a traditional Navajo religious area. The affected portion of the lease is closed to Off-Road Vehicle (ORV) use, no new roads or trails will be authorized, existing access will be maintained, and no surface disturbance activities will be allowed.

[NM-8130]

APPENDIX J
NET ENERGY ANALYSIS

APPENDIX 1

NEW ENERGY ANALYSIS

NET ENERGY ANALYSIS

The accompanying "net energy analyses" estimate the amount of energy in the coal produced on the Preliminary Coal Lease Tracts, the energy expended in its production, and the energy in the coal left in the ground as not being economically recoverable.

The energy input shown as required for "production and transportation" includes all energy required to produce the coal and transport it to a rail shipping point. This comprises fuel used directly or as electricity for mine production, truck transportation of coal, and transportation of personnel and supplies, and also the energy used for manufacturing or constructing the mining and transportation equipment and facilities needed and for manufacturing supplies. Also included is the petroleum used in hydraulic fluids, lubricants, and explosives and the hydrocarbons in feedstocks used in supply manufacture.

The energy input shown as required for "infrastructure" includes the energy consumed as electricity, natural gas, heating oil, and gasoline by mine employees and families, by a similar number of service employees in the production area who support them and by a porportionate number of commercial establishments. Also included is the energy consumed by workers producing the equipment and supplies used for coal production and by the service employees and commercial establishments that support them.

Estimates of electricity, fuel and mining supply consumption and of mine equipment and facility depreciation are based on figures and examples provided in Instruction Memorandum No. 83-368, Energy Analysis in Regional Coal Environmental Impact Statement and Instruction Memorandum No. CO-81-302, Net Energy Analysis.

Nationwide and statewide averages of energy minerals used per dollar-added-in-manufacturing were used to estimate the energy consumed in manufacturing equipment and supplies for which only a dollar measure of quantity is reported in statistical abstracts. Similar National and State averages of electricity, natural gas, and gasoline used per household were used for estimating infrastructure consumption.

Energy consumption is considered as beginning for electricity with deliveries of coal or other fuels to the generating station, for petroleum products with deliveries to area suppliers, and for natural gas with deliveries to consumers. The analysis ends with the coal loaded in rail cars for shipment. Rail shipment of coal requires about 600 Btu's per ton mile in the form of direct energy and a similar amount is estimated as being consumed indirectly and by associated infrastructure. About one-half percent of the energy in coal is required to transport it 100 miles by rail.

NET ENERGY ANALYSIS
(BILLIONS OF BRITISH THERMAL-UNITS (BTU'S)

Alternative	Output (Total)	Input (Total)	Ratio
No Action	0	0	0
Bypass	2.0322×10^{15}	5.8927×10^{13}	34.5:1
Minimum Surface Owner Conflict	1.2895×10^{16}	5.2607×10^{14}	24.5:1
Target	1.9107×10^{16}	6.7898×10^{14}	28.2:1
High	2.5773×10^{16}	8.1289×10^{14}	31.7:1

GLOSSARY

CROSSWAY

GLOSSARY

ACRE-FOOT. The volume of water that would cover one acre to a depth of one foot. It is equivalent to 43,560 cubic feet.

ACTIVITY OCCASIONS. One person participating in one recreation activity during 12 or more hours of one day.

ALKALI SOIL. A soil with a high degree of alkalinity (pht of 8.5 or higher) or with a high exchangeable sodium content 215 percent or more of the exchange capacity), or both. A soil that contains sufficient alkali sodium to interfer with the growth of most plants.

ALLOTMENT. An area of land designated and managed for grazing of livestock.

ALLUVIUM. Clay, silt, sand, gravel, or other materials transported by flowing water and deposited in comparatively recent geologic time sorted or semisorted sediments in riverbeds, estuaries, and flood plains, on lakes, shores, and in fans at the base of mountain slopes.

ANIMAL UNIT MONTH (AUM). Amount of forage required to sustain one cow or its equivalent for a period of one month. This is approximately 720-780 pounds dry weight forage per month. AUM equivalents are: 1 horse = 1 cow; 5 sheep = 1 cow; 5 goats = 1 cow; 2 elk = 1 cow; and 5 deer = 1 cow.

AQUIFER. A geologic unit which contains water and which is permeable enough to transmit that water to wells and springs. A bedrock aquifer consists of consolidated rock; an alluvial aquifer consists of unconsolidated valley-fill deposits

AREA OF CRITICAL ENVIRONMENTAL CONCERN (ACEC). An area within the public lands where special management attention is required (when such areas are developed or used, or where no development is required) to protect the area and prevent irreparable damage to important wilderness, cultural, recreational, paleontological, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards.

ARTESIAN CONDITIONS. Ground water which is under sufficient pressure (always greater than atmospheric) to rise above the top of the aquifer when tapped by a well. This ground water does not necessarily rise to or above the land surface. A flowing artesian well flows at the land surface. Artesian is synonymons with confined.

ASSOCIATED (SOIL). A group of soils geographically associated in a characteristics repeating pattern and defined and delineated as a single map unit.

AVAILABLE WATER. The portion of water in a soil that can be readily absorbed by plant roots.

AVAILABLE WATER CAPACITY. The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

BADLANDS. Steep or very steep, commonly nonstony barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geological material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

BASKETMAKER. Basketmaker sites are Anasazi sites dating from about 500 B.C. to A.D. 750 representing the development of Pueblo agriculturalism and permanent habitation sites.

BEDROCK. The solid rock that under lies the soil and other unconsolidated material or that is exposed at the surface.

BIOTA. All the microorganism, fauna and flora associated within a given environment.

BLOWN-OUT LAND. Areas from which all or almost all of the soil and soil material has been removed by wind erosion. A miscellaneous land type.

BONITO PHASE. The period from between approximately A.D. 900-1125 when the Chacoan Anasazi constructed the "Great Pueblos" which are believed to have been public buildings associated with a complex social system involving Chacoan Outliers.

BRITISH THERMAL UNIT (Btu). The quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit at or near 39.2 degrees Fahrenheit.

BROWN SOILS. A great soil group of the temperate to coal arid regions, composed of soils with a brown surface and a light-colored transitional subsurface horizon. They develop under short grasses.

BULK DENSITY (SOIL). The mass of dry soil per unit bulk volume including the air space.

CHACOAN OUTLIERS. More than 70 prehistoric pueblo communities connected by a system of roads and visual communication into a sophisticated socioeconomic complex centering on the Chaco Culture National Historical Park (ca. A.D. 828-1178).

CLINKER. Remnants of burned coal.

COARSE-TEXTURED SOIL. Sand or loamy sand.

COLLUVIUM. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the bases of steep slopes.

COMPONENT. The assemblage of artifacts left by each of two or more cultural groups using a single site at different periods.

CONDENSATE. A liquid obtained by condensation of a gas or vapor.

CRETACEOUS. Period of geologic time known as the "Age of the Dinosaurs", 130-63 m.y.

DECLARED UNDERGROUND WATER BASIN. An area in New Mexico declared by the State Engineer when he feels that management controls of ground water are necessary.

EOLIAN SOIL MATERIAL. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

EPHEMERAL STREAM. A stream that flows only in response to a storm.

EROSION. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

EXCHANGE CAPACITY. The capacity of a soil to exchange ions as measured by the quantity of exchangeable ions in that soil.

FACIES. The aspect belonging to a geologic unit of sedimentation, including mineral composition, type of bedding, fossil content, etc.; also a stratigraphic body as distinguished from other bodies of differing appearance or composition.

FERTILITY (SOIL). The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable

FINE TEXTURED. Sandy clay, silky clay, and clay.

FLOODPLAIN. A strip of relatively flat alluvium that borders a stream and is subject to repeated flooding.

FLUVIAL. Of or pertaining to a river or rivers. Produced by the action of a stream or river.

GROUND-WATER DISCHARGE. The process of depletion of ground water from an aquifer.

GROUND-WATER FLOW. The movement of ground water within an aquifer.

GROUND-WATER RECHARGE. The process of replenishing ground water in an aquifer.

HOMESTEAD. Usually 640 acres of public land obtained by an individual filing for title in accordance with homestead laws administered by the BLM. An individual must have resided on the land and constructed a certain number of improvements to obtain title. Title to Indians qualified for homesteads was usually issued as a Trust Patent. A Trust Patent is issued in the name of an individual Indian, but the land is held in trust by the United State and administered by the BIA.

HORIZON (SOILS). A layer of soil, approximately paralled to the surface, having distinct characteristics produced by soil-forming processes.

INDIAN ALLOTMENT. The act of February 8, 1887 made provision for Indians not living upon a reservation or for whose tribe a reservation had not been provided. Indians settled upon public land not otherwise taken were entitled upon application to have land allotted to them. Allotment titles were issued under Trust Patent.

INFILTRATION. The downward entry of water into the soil.

INFILTRATION RATE. A soil characteristic determining or describing the maximum rate at which water can enter the soil under specified conditions, including the presence of an excess of water.

IMMATURE SOIL. A soil with indistinct or only slightly developed horizons because of the relatively short time it has been subjected to the various soil-forming processes.

INVENTORY. A descriptive listing and documentation, including photographs and maps, of cultural resources; included are the processes of locating, identifying, and recording sites, structures, buildings, objects, and districts through library area archival research, information from persons knowledgeable about cultural resources and varying levels of intensity of on-the-ground field surveys.

LENTICULAR. Having the shape of a double-convex lens.

MONOCLINE. A geologic structure (series of strata) dipping only in one direction.

NATIONAL REGISTER OF HISTORIC PLACES. The official list, establish by the Historic Preservation Act of 1966, of the nation's cultural resources worthy of preservation. The Register lists archaeological, historic, and architectural properties (i.e., districts, sites, buildings, structures, and objects) nominated for their local, State or national significance by State and/or Federal agencies and approved by the National Register staff.

NATIONAL REGISTER QUALITY. Thcse cultural resource properties which meet the National Register criteria and have been determined eligible for nomination to the National Register of Historic Places by virture of their local, State, or national significance.

NAVAJO. The largest Indian tribe in the United States. Entering the southwest ca. A.D. 1500 as nomadic hunter/gatherers, by A.D. 1696 the Navajo had turned to the herding/gardening economy practice by many tribal members today.

OUTCROP. That part of a geologic formation or structure that appears at the surface of the earth.

OVERBURDEN. Unconsolidated rock material overlying a mineral deposit and which must be removed prior to mining.

PARENT MATERIAL. The unconsolidated organic and mineral material in which soil forms.

PERMEABILITY (SOIL). The ease with which gases, liquids, or plant roots penetrate or pass through a bulk mass of soil or a layer of soil.

P.L.O. 2198 LANDS. Public domain lands originally granted to the railroad. In 1921 these lands were reconveyed back to the federal government and other lands selected by the railroad in an attempt to consolidate railroad grant and Indian lands into solid blocks of holdings. Under Public Land Order 2198 these reconveyed lands were set aside for Indian use and placed under the administration of the BIA. The BIA issues 90-day revocable homesite leases on 2198 lands.

POROSITY. The amount of open pore space in a consolidated or unconsolidated geologic formation.

PREFERENCE RIGHT LEASE APPLICATION (PRLA). A formal request made to the BLM for a non-competitive coal lease. PRLAs were issued by the Secretary of the Interior in the San Juan Basin between 1971 and 1973 to the holders of prospecting permits. These individuals or companies were required to demonstrate that, during the period of the permit, they had discovered commercial quantities of coal.

PRODUCTIVITY (SOIL). The capacity of a soil for producing a specified plant or sequence of plants under a specified system of management.

PROFILE (SOIL). A vertical section of the soil extending through all its horizon and into the parent material.

PROVENIENCE. Source of origin of fossil material in relation to the depositional environment.

PUBLIC LANDS. Lands owned by the United States and managed by the Department of Interior, Bureau of Land Management.

RANK. A coal classification based on the degree of change in molecular structure of the coal, caused by great heat or pressure (metamorphism). There are four major ranks. The lowest rank, lignite, is the least metamorphosed while the highest rank, anthracite, is the most highly metamorphosed. Subbituminous is the rank just above lignite, wiht bituminous ranked above subbituminous. Ranking is determined by the number of Btu's in one pound of the coal being classified. The letter A, B, or C after a rank classification is a subdivision within that rank.

REGRESSIVE. Pertaining to a retreat or contraction of the sea from land areas.

RESIDUUM (RESIDUAL SOIL MATERIAL). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

RIVER BASIN. The area drained by a river.

ROUGH BROKEN LAND. Land with very steep topography and numerous intermittent drainage channels but usually covered with vegetation.

RUNOFF. The precipitation discharged in stream channels from a drainage area.

SALVAGE. The recovery of material and data from an affected cultural resource, prior to its alteration or destruction, through, recordation documentation, partial or total excavation, and collection for analysis and interpretation.

SITE. A physical location utilized by human beings for a specific purpose. An archeological site is identified as having been used by humans in the past through the artifacts that remain.

SLICK SPOTS. Small areas that are slick when wet, due to a high content of alkali or of exchangeable sodium.

SLOPE. The inclination of the land surface from the horizontal.

SOIL. A natural, three dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the intergrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

SOIL (organic matter). The organic fraction of the soil that includes plant and animal residues at various stages of decomposition, cells and tissues of soil organisms, and substances synethesized by the soil population.

SPECIFIC CAPACITY. The rate of discharge of water from a pumping well divided by the water-level decline within the well.

SPOILS. Waste rock material generated by surface mining.

STRUCTURAL BASIN. A roughly bowl-shaped depression which is filled with sedimentary rocks. A structural basin owes its form to tectonic activity.

STRUCTURE (SOIL). The arrangement of primary soil particles into compound particles or aggregates.

SUBBITUMINOUS COAL. Coal having between 8,300 and 13,000 BTU per pound.

SUBSOIL. Technically, the B horizon; roughly the part of the solum below plow depth.

SUBSTRATUM. The part of the soil below the solum.

SUBSURFACE LAYER. Technically, A_2 horizon.

SURFACE SOIL. The uppermost part of the soil, ordinarily moved in tillage, or its equivalent in unculturated soils and ranging in depth from 3 to 4 inches to 8 to 10.

TEXTURE (SOIL). The relative proportions of sand, silt, and clay particles in a mass of soil.

TRANSGRESSIVE. Pertaining to a spread or extension of the sea over land areas.

TRANSMISSION LOSS. The process of seepage of surface-water flow into stream bed deposits.

TRANSMISSIVITY. The rate at which ground water is transmitted through a unit width of aquifer under a unit hydraulic gradient.

UPLAND (GEOLOGY). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

VISITOR-DAY. Twelve visitor-hours, which may be aggregated continuously, intermittently, or simultaneously by one or more persons. Visitor-days may occur either as recreation visitor-days or as non-recreation visitor-days.

VOLATILE. Changing readily to vapor.

VRM (VISUAL RESOURCE MANAGEMENT). The system by which the Forest Service and BLM classify and manage the visual resource of public lands under their respective jurisdictions. Based on their scenic qualities, sensitivities, and the distances from which they are viewed, the lands are classified into management units.

VRM CLASS I. A BLM visual resource management classification that allows for natural ecological change only.

VRM CLASS II. A BLM visual resource management classification that allows for management activities that are not visually evident.

VRM CLASS III. A BLM visual resource management classification that allows for management activities to be visually evident but subordinate to the landscape character.

VRM CLASS IV. A BLM visual resource management classification that allows for management activities to subordinate the landscape character.

VRM CLASS V. A BLM visual resource management classification that identifies areas where manmade disturbance is excessive and rehabilitation is necessary.

WATER TABLE CONDITIONS. Ground water which is under atmospheric pressure. This ground water does not rise above the top of the aquifer when tapped by a well. Water table is synonymous with unconfined.

WEATHERING. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents.

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REFERENCES

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VISUAL E

SAN JUAN RIVER COAL REGIONAL ENVIRONMENTAL IMPACT STATEMENT

LEGEND

MAJOR PROPOSED ACTIONS

- NM-6802 — PREFERENCE RIGHT LEASE APPLICATION
- COMPETATIVE COAL LEASE TRACT
- EXISTING LEASE
- WILDERNESS STUDY AREA
- EXISTING RAILROAD
- PROPOSED RAILROAD

N

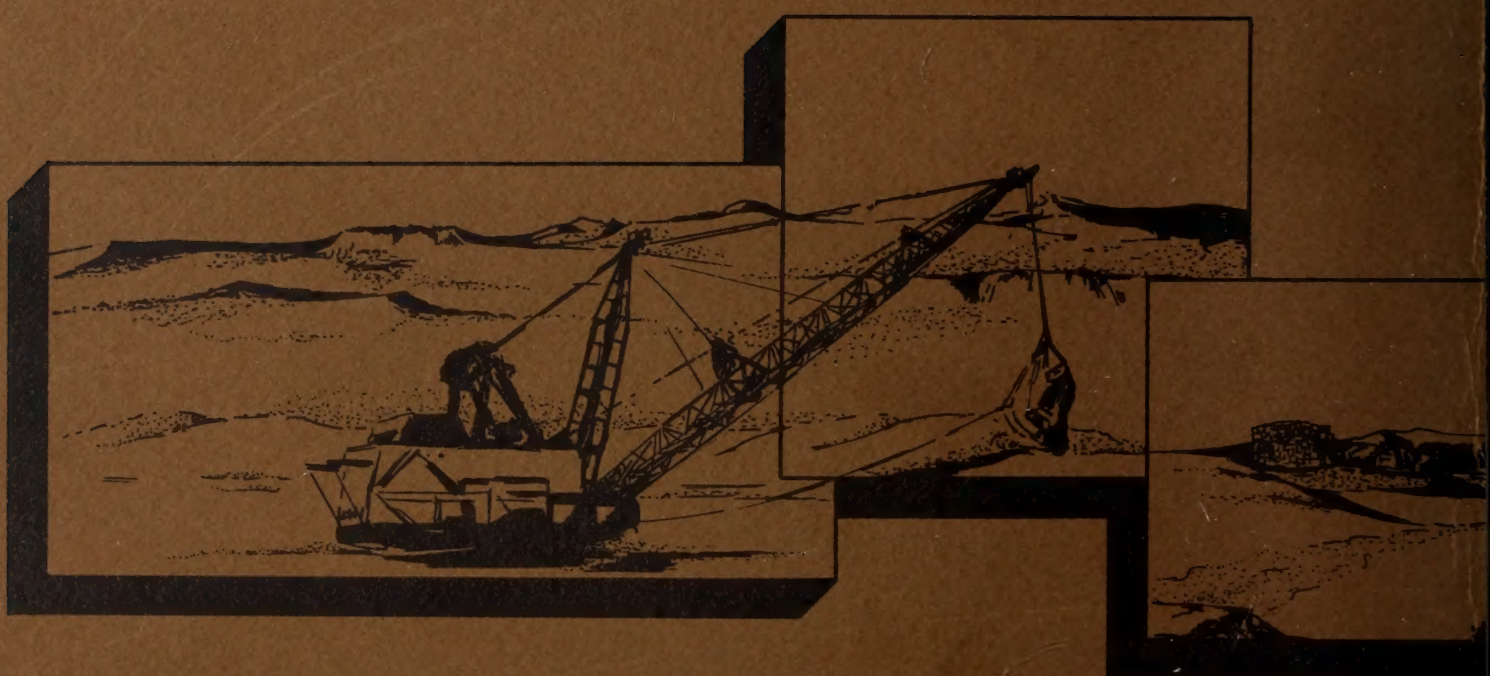
0 5 10 MILES
SCALE

HUERFANO TRADING POST
BLANCO TRADING POST
OTIS
NAGEEZI
LYBROOK
COUNSELOR
JICARILLA APACHE INDIAN RESERVATION
KIMBETO
TSAYA
CHACO CULTURE NATIONAL HISTORICAL PARK
CUBA
SANTA FE NATIONAL FOREST
STAR LAKE
TORREON
JOHNSON TRADING POST
CAÑON DE SAN DIEGO GRANT
JEMEZ INDIAN RESERVATION
ZIA INDIAN RESERVATION
NAVAJO INDIAN RESERVATION
CROWNPOINT
GALLUP
THOREAU
FARMINGTON
LA PLATA
UTE MTN INDIAN RESERVATION
CIBOLA NATIONAL FOREST
BARTOLOME FERNANDEZ GRANT
CEBOLLETA GRANT
NUESTRA SENORA DE LA LUZ DE LAS LAGUNITAS GRANT
LAGUNA INDIAN RESERVATION
TOWN OF ALAMEDA GRANT
IGNACIO CHAVEZ GRANT
FELIPE TAFOYA GRANT
ZUNI INDIAN RESERVATION
FORT WINGATE

DE-NA-ZIN WILDERNESS STUDY AREA
BISTI WILDERNESS STUDY AREA
AH-SHI-SLE-PAH WILDERNESS STUDY AREA
EMPEDRADO WILDERNESS STUDY AREA
LA LENA WILDERNESS STUDY AREA
IGNACIO CHAVEZ WILDERNESS STUDY AREA
CHAMISA WILDERNESS STUDY AREA
CABEZON WILDERNESS STUDY AREA

BISTI #2
BISTI #1
BISTI #6&8
BISTI #4(a&b)
KIMBETO #1
KIMBETO #2
GALLO WASH #1
GALLO WASH #2
STAR LAKE EAST #1
STAR LAKE EAST (LC)
STAR LAKE WEST #2
LA PLATA #1
LA PLATA #2
LA PLATA #3
LA PLATA #4
CROWNPOINT EAST
CROWNPOINT NORTHEAST
HOSPAH #2
HOSPAH #1
DIVIDE
CHICO WASH SOUTH
OJO DEL ESPIRITO
SANTO GRANT
LEE RANCH WEST
LEE RANCH MIDDLE
LEE RANCH EAST
GAMERCO #2 (UG) (LC) (ENTIRE TRACT)
GAMERCO #1 (LC)
SAMSON LAKE #1 (ENTIRE TRACT)
GAMERCO #1 (HC)
SAMSON LAKE #2
CATALPA CANYON
HOGBACK
SUNDANCE
BREAD SPRINGS #1
BREAD SPRINGS #2
TWIN BUTTES
TAH-HA-BAH WELL
PINEHAVEN

NM-6801 NM-3834 NM-11916 NM-3835 NM-7235 NM-6803 NM-3753 NM-3752 NM-3836 NM-3764 NM-10931 NM-3837 NM-3755 NM-6804 NM-3913 NM-3919 NM-3918 NM-8129 NM-8745 NM-9764 NM-11670 NM-8130 NM-8715 NM-2457 NM-585 NM-8747 NM-0186612 NM-0186613 NM-0186615 NM-6802

MAP AREA
Farmington
Taos
Santa Fe
Gallup
Grants
Albuquerque
Socorro
Roswell
Carlsbad
Las Cruces
NEW MEXICO

PREPARED BY THE ALBUQUERQUE DISTRICT, BUREAU OF LAND MANAGEMENT, 1983